

**SHED SOME
LIGHT ON
YOUR
TAPE PROBLEMS
SEE inside
COMPUTER-LINK (UK)
page 18.**

NEWS IN BRIEF**Nick Bark
leaving PEDS**

NICK BARK, managing director of Perkin-Elmer Data Systems' European operation for the past three years, has resigned to become president of European operations for a large US electronics company which is planning to break into markets on this side of the Atlantic. The company is understood to be one of the leaders in the defence market.

Bark joined Interdata, as it was then, in 1976 when the European operation had sales of \$7 million a year and a staff of about 60. Sales for the present year are expected to be about \$45 million and UK staff alone totals 200.

More disc power

FHANCHING the specifications of the yet to be delivered System 38 database-oriented business computer, IBM has announced that up to four of its 570 Mbyte 3370 fixed disc drives can be fitted to the 38/5. Total cost, including adaptor, is £68,207, or £3,50 per Mbyte.

Shipping launch

A MONTHLY magazine called Lloyds Shipping Economist with detailed analyses of world shipping developments was launched this week by Lloyds of London Press. Its contents are largely based on reports generated by Lloyds Digital Equipment PDP-11/70 system at Colchester, from Lloyds' own database on ship movements and from technical data supplied by Lloyds Register of Shipping.

Growing role

SPECIALIST services for Univac's BC7 small business computer are likely to be a growing part of the business. Guardian Computer Services, of Manchester, an approved Univac software house, the company has installed a 128K BC7 in its new premises at St James' House, Pendleton Way, Salford, Manchester 6.

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Wly Corp chairman replaced

SAM WLY, who founded the University Computing Company in 1963, has been replaced as chairman and chief executive officer of UCC's parent, the Wly Corp, by John Kason from the UK. Wly's share in the Dallas, Texas, company was reduced from 11% to 2% last year when its principal creditor, Carel Holding of Zurich, took a controlling interest.

Wly Corp ran into serious financial trouble in 1976 after the collapse of its ambitious microwave-based data network, Datran.

To avoid having to seek protection under the US bankruptcy laws, Wly settled its debts with a recapitalisation plan under which creditors were offered 100 shares and \$10 cash for every \$1,000 they were owed. Carel Holding, which had put \$50 million into Datran, ended up with 51% of Wly Corp stock.

Carel's relationship with UCC began in the late Sixties when Carel's boss, Walter Hafner, sold his Zurich-based Automation Center bureau network to

UCC and took a minority share in the Dallas company.

Sam Wly told Computer Weekly that his only involvement with Wly Corp now was as an advisor to the company on its \$300 million anti-trust suit against AT&T, the US telecommunications giant. Wly Corp is charging AT&T with introducing unreasonably low rates for data transmission services in 1974 which made it difficult for Datran to sign new customers.

The other leading European in the Wly Corp story, John Kason, joined UCC when the latter acquired Computer Services (Birmingham) Ltd in 1967. He rose through the ranks, being elected to the board of the Dallas company in 1974, and was made president last year (CW, March 9, 1979).

UCC says that Kason "saw through" last year's recapitalisation.

Thorn tipped as Modcomp bidder

LATEST UK company to ride the US takeover trail is Thorn Electrical Industries — and the domestic appliance and consumer electronics giant is strongly tipped as one of two multinational companies bidding for Modcomp.

The new president of Modcomp, Alexander Giles, declined to comment on suggestions that either Thorn or GEC was interested in his company, but

strongly rejected a widely-touted rumour that GEC had come back for more talks.

Thorn is seeking to diversify into the microprocessor applications and communications fields, and already has a UK joint venture with Ericsson of Sweden on private digital telephone exchanges.

Although Modcomp does not precisely fit the profile of the company Thorn is seeking, and Thorn would neither confirm nor deny its interest, sources indicate that not only is Thorn bidding but that it is the frontrunner.

The other multinational company interested in Modcomp is Northern Telecom of Canada. Thorn has announced that it has conducted studies in the microelectronics field with a view to making acquisitions in the US and Europe, and sources say that it has independently identified several US companies already studied by GEC as possible acquisition candidates.

Modcomp is also noted for its Maxnet communications software.

Nippon introduces new Acos in response to the 4300s

FIRST off the blocks in Japan to respond to IBM's new 4331 was Nippon Electric with a new model in its Acos-77 line.

The 4300s have not yet been announced in Japan, and observers believe that the government is trying to persuade IBM not to price them too competitively, lest they drive the indigenous manufacturers out of the low-end mainframe market.

Key features of the new machine include new control processor, communications controller supporting up to 64 workstations, and a separate disc controller. A new Codasyl database called ADBS has also been introduced, together with interactive software for online

AS a result of expansion in business, the Neill Group of engineering and tool companies Giles told Computer Weekly that the minicomputer submitted revised accounts for 1973 to 1978 to the US Securities

Police drop 'suspect' plan

THE controversial plan for a national network of police computers holding "intelligence" on suspects rather than hard facts about convicted criminals, has been dropped.

An experimental system at Thames Valley Police Headquarters at Kidlington in Oxfordshire (CW, November 30, 1978) resulted in considerable objections from organisations such as the National Council for Civil Liberties because it was used to store what is said to be hearsay about the characteristics of named individuals.

The decision to drop the plan was made by a committee of senior police officers and Home Office officials headed by Ken Oxford, Chief Constable of Merseyside. He said that the Thames Valley system had "inherent dangers."

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Council assurance on police sharing

ASSURANCES have been given by Doncaster Council that its proposed sharing of its computer facilities by the magistrates' courts and prison will not jeopardise information held on the system. The courts will have their own computer.

"It is not an actual fact," said a council spokesman, "that the courts and police will be doing is using our powers to produce documents on court cases and documents of various fines etc via ICL 7502 terminal points."

Currently running a System 4/72 and 4/50 at its Hayes, Middlesex, computer centre, Allied is to start installing a dual ICL 2900 system worth £1.6 million, in August. The first processor will replace the 4/50 and be mainly for development and VME/B.

According to Wilson, the categories are: fraud, from the files of the Fraud Squad; drugs; illegal immigrants (these last two from the Central Drugs and Illegal Immigra-

What Scotland Yard holds on intelligence system Burroughs challenge to 4300

THE veil of secrecy over Scotland Yard's intelligence computer system was lifted slightly this week when Assistant Commissioner John Wilson listed, on the BBC2 programme *Man Alive*, the five categories of information held on the system.

Hitherto the Home Office has refused, even in answer to Parliamentary questions, to say anything more about the machine, than that it contains indices of crime, criminals, and their associates.

There is space on records there for officers to insert comments such as suspicions about motor vehicles and the like, indicating vehicles and people the police have an interest in tracing, he said.

The PNC ostensibly records only criminal

records, wanted and missing persons, and vehicle ownership.

Wilson's revelations on television were apparently an indiscretion, and have angered Labour MP Jo Richardson (Barking) who intends to ask the Home Secretary why she was refused such information in response to a Parliamentary question.

Further to last week's report that plans for a nationwide police intelligence system have been dropped (CW, February 22), the Home Office has denied that any such plans existed. It affirms, however, that the Thames Valley experimental intelligence system is to continue in operation for another year.

Roberts moves to GEC

DEREK ROBERTS is to leave Plessey at the end of April, and will be joining GEC as director of research, and head of the Hirax Research Centre, Wembley, one of the largest electrical and electronic laboratories in the UK.

In his new position, he will report to Robert Clayton, technical director of GEC, and chairman of the new GEC Fairchild semiconductor company.

At Plessey, as divisional managing director and chairman of Plessey Microsystems and Plessey Semiconductors, he was responsible for Plessey's own research efforts at the Allen Clark Research Centre at Cesswell, Northants.

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Civil servants show their teeth

TAKING industrial action which the Prime Minister has called "unnecessary and unjustifiable", civil servants seeking pay increases of up to 30% went into battle with the government this week in the first major confrontation of its kind.

Wielding the power to paralyse nationally important computer centres at short notice, the Civil and Public Servants Association and the Society of Civil and Public Servants pulled out computer and clerical staff from key sites indefinitely, in a bid to get a pay increase before April 1 when their present wages contract expires. They want this to be based on a comparison survey carried out by the Pay Research Unit (CW, February 8).

There seems little hope of a quick end to the stoppage. With a strike fund of over £1 million to keep their members on full pay, estimates of how long they

effect will also be hit because computer engineers, who are members of ASTMS, have agreed not to service computers at strike-hit centres.

The first casualty, even before the national stoppage on Friday, February 23, was the Customs and Excise installation at Southend which came to an abrupt halt last Thursday. About £500 million of VAT revenue a week is being blocked, and on the other hand, businesses expecting to get a share of the normal £100 million a week VAT

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Customs blame agents for faulty figures

INCORRECT entries from export and import agents are emerging as the cause of gross inaccuracies in the 1978 overseas trade figures for analogue and hybrid computers revealed in Computer Weekly last month (CW, February 8).

The Customs, which tabulates the figures, has thanked Computer Weekly for pointing out the inaccuracies.

According to the figures, exports of analogue and hybrid machines grew at a phenomenal rate, from less than £13 million in 1977 to nearly £73 million in 1978. The import figures also showed a dramatic increase, from £7 million to £13 million.

Customs told Computer Weekly, "Preliminary examination of entries on export/import documents (from agents) under the heading of analogue and hybrid data processing machines suggests that items have been included that should

● Turn to page 17

Star entry

CLOSING date for Computers 79 is March 10, so don't miss the chance of entering your teams. An entry form is on page 17 and full conditions of entry were published in Computer Weekly on February 18.

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1984 and all that . . .

THIS week's example of the funny things people say in the media about computers was sent in by Rose Petru, of Hampstead, who wins £5. The cutting is from the letters page of the Weekly News.

The standard of refereeing leaves a lot to be desired. So what to do that hasn't already been tried?

In this electronic age, it shouldn't be beyond the experts to devise a computer, programmed to accept signals from miniature TV cameras positioned strategically around the pitch so that all angles are covered.

These would produce a clear picture of any unfair incident. The computer would send out a short, strident wail. Play would stop immediately.

A computer controller, who would, in effect, be replacing the referee, and be seated high in the stand, would make a verbal announcement of the offence. — A. HILDEBOLD, St Leonards (23 letter).

• What a fantastic idea! Next step, of course, would be to have robots as players — although come to think of it, many are already playing like robots (Editorial comment).

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A lesson in management from Japan

WITH British management coming under Princely scrutiny last week, a look at the style of management in one of our most successful trading competitors, Japan, seems timely.

We have all read about blissfully happy employees, the concept of employment in one company for life, and the fact that apparently nobody ever gets laid off by a big company, regardless of how much production is automated. At worst, surplus employees end up doing socially useful things like sweeping the lawns outside the factory.

Who are the managers responsible for the apparently highly desirable state of affairs in Japanese industry?

First of all, as likely as not, they are engineers. In Japanese society, wedded to status, engineers come near the top of the tree. According to John Prentice, Counsellor for Science and Technology in Tokyo for the past three years, a good 60 per cent of top managers in Japan are engineers — and engineers are typically paid 10 per cent more than their peers in professions like Law.

One of the major problems in the UK appears to be that individuals become too indispensable too early in their careers — so vital in one particular role that time spent on acquiring experience of a broadening rather than a specialist nature cannot be economically justified.

After that, he may go into

another interim posting, perhaps personnel management, or he may return to his specialisation, at which point, after a refresher course, he will be regarded as someone well fitted to head a development effort.

He will have lost no seniority as a result of his time "off the job"; on the contrary he will be more highly regarded for it.

The age of about 35, he will learn whether he is marked out for the very top, or whether he will spend the rest of his career in the lower echelons of management.

We say that we could not afford to "waste" key people in posts not directly related to their expensive training and hard-won experience. And yet typically these key people are soon lost to the company which "can't spare them," through the rigours of pay restraint and the temptations put in the way of

individuals who feel they know better than their big company employers.

For example, Japanese visitors look in amazement at the array of highly innovative software and systems houses in the UK and say they have nothing like that in Japan.

On the other hand, Japan still has five major mainframe manufacturers while Europe, almost three times as large, has only 21.

And wouldn't it be salutary for all those creative designers in companies like ICL to have to go out some time and actually try to sell the machines they had designed?

growing by 17 per cent a year. The international marketplace is likewise booming with industry giants reporting record revenues.

Apples may be thick on the ground, but try ordering the new IBM 4300s — delivery will be from next year's crop.

IBM-compatible mainframe manufacturers are equally eminent. Intel, Amdahl and the latest Japanese entrants are expanding fast. Last month, Control Data introduced a new machine, Cyber 203, which it is claimed can provide a hundred million calculations in a single second. Try that on your micro!

Development is not limited to mips technology. Memory storage devices, all aimed at the lucrative IBM-compatible market, are being developed using electron beam memories, thin film heads and charge-coupled technology. It may be fashionable to suggest the imminent demise of the mainframe. But it is based on a false assumption that the assorted assault of the micro, word processing systems and distributed processing are a threat to the established installation.

The micro is complementary to the mainframe, not an antagonist. Far from the mainframe being squeezed out and left stranded high and dry in their installations, medium and large-scale computing is in a healthy state.

Industry forecasts suggest that the European marketplace for large-scale computers is

already made by Ohio-Nuclear, and half will be entered as future sales are made.

EMI also has suits pending against Pfizer and the US General Electric Company, and hopes that the payment by Johnson and Johnson will encourage the other two companies also to settle out of court.

The American GE is developing the scanner as an industrial inspection device, with an application which scans components of jet engines to find flaws in the metal. EMI says that since its patents cover the principle of CAT scanning, industrial inspection is also covered.

Half the payment will be entered in EMI's accounts for the current year, as royalty for sales

Ten years ago...

COMPUTER WEEKLY

FEBRUARY 27, 1969

GREYHOUND Computer Corp was back to teach off project at Essex University for the development of an interactive terminal for use in hospitals... Software first started with a report that multi-access systems took up a lot of room and how ICL got round this with its Multicore system. Philips Electronics, at the UK subsidiary of Philips Industries, launched the R3010 series of office computers.

Watch out for the Bogle Strike

If you live in Lancashire, forget to look out for anti-the-walkers in the annual Stroll this weekend. This is organised by the students of the University of Salford and the Salford Rag.

This is not to say that training programmes in British companies do not frequently give individuals a taste of various parts of the business in their earliest years. But it is only during the earliest years, and it is typically no more than six months in sales or production.

The difference is that in Japan this continues much longer into an individual's career, and the periods in different occupations are for three or four years — long enough for the embryo manager to do an effective job, rather than simply see how it is done.

The negative side of the Japanese system is summed up in the fact that they are typically innovative only in applying technology imported from the US and Europe, and that new small, high technology companies are much less likely to be formed by disgruntled individuals who feel they know better than their big company employers.

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Time runs out for Freedom of Information Bill

THE Committee Stage of Clement Freud's Freedom of Information Bill finished last week, leaving supporters with the task of trying to get more debating time allocated to it when it returns to the floor of the Commons for Report Stage on April 18. About five hours will be available for it on that Friday — not nearly enough for consideration of the Bill's 40 clauses.

Both front benches appear more determined than ever to implement the Bill. It is expected that the government will introduce major amendments at Reports Stage that may cancel out the central purpose of the Bill.

The First Division Association, the trade union for top civil servants, has announced that it is not opposed to the Bill, but is

concerned that it does not give enough protection from exposure to "intragovernmental communications". These would be advice given by civil servants to Ministers about contentious policy issues, and the FDA feels it is essential to be able to keep these secret, as is done in other countries that already have Freedom of Information Acts.

The Association says that, should the Bill become law, its members will seek to implement it as effectively as possible, but there is concern over the "additional administrative burden" that will arise. This needs to be quantified now, the FDA asserts.

A MULTI-USER turnkey system for accountancy practices has been launched by Hartley Computer UK Ltd. Called Large Scale Hapas, the system is configured round Digital Equipment hardware and includes a novel intelligent terminal designated the VT103.

A standard VT100 modified by incorporating a 64K LSI-11, the VT103 is quite similar to DEC's PDT-11 terminal, but has a greater communications capability, transferring data at up to 38,000 chps.

Established in Brisbane in 1974 specifically to develop accountancy systems, Hartley Computer has enjoyed considerable success with its Hapas system.

In Australia, an estimated three out of every four accountancy practices are said to be Hapas users. There are nearly 500 users worldwide, including 25 in the UK where the company began trading last August.

Nearly all of these are single user systems, built round the Wang 2200 series.

Like this system, Large Scale Hapas features a word processing capability for producing standard reports and also uses character-by-character input checking. It is based on a PDT-11/03 central processor, supported by 64K RAM.

Bigger and earlier Compec

STEADILY pushing itself further into the systems market, Intel has introduced two new products this week that extend its dynamic memory as seen in an essential precursor. Using an 8085 as the CPU, it also includes three other processors operating as slaves. These are 8741 universal peripheral controllers which act as peripheral front-ends to the CPU.

With its 64K RAM scheduled for introduction by the middle of this year, the new 2118, 16K dynamic memory is seen as an essential precursor. It operates on a single 5V supply, giving it the same pin-out as the 64K part. With its fast access time of around 80 nanoseconds, Intel sees the part being designed into systems as a stopgap for the 64K memory, which should hit volume production in 1981.

Systems sales already account for some 50% of Intel's annual sales, and the new systems products are expected to help expand this sector. The main introduction is an industrial control system, known as ICS-80.

In essence, this is a chassis rack system equipped with Intel's standard Multibus bus structure as the backplane. Into it can be plugged any circuit board from the company's range of single-board computer systems, which include not only

No conflict on bank terminals

NO conflict is expected between Plessey and Univac over marketing of the Bunker Ramo System 90 line of banking terminals. As exclusively reported (CW, November 23, 1978) Univac is to market the Bunker Ramo System 90 line to its mainframe customers in the banking world, including the UK. Plessey will market the terminals to all other UK banking customers.

Exhibitors have been told of the change, and of the fact that previously-announced charges for stands and space will remain unaffected.

NEARLY three years after the beginning of its legal battles over patent infringement in the US, EMI has paid its first overseas royalty of \$15 million for the CAT medical diagnostic scanner.

The payment was by Johnson and Johnson which has just acquired the Technicare Corp., Ohio-Nuclear, a subsidiary of Technicare, manufactures and markets CAT scanners, and EMI filed patent infringement suits against the former in July 1976 and February 1978.

The American GE is developing the scanner as an industrial inspection device, with an application which scans components of jet engines to find flaws in the metal. EMI says that since its patents cover the principle of CAT scanning, industrial inspection is also covered.

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DELAYS in the programming of the last level of the Talisman settlement system at the Stock Exchange have put back two weeks the date it is scheduled to go live — from March 26 to April 3.

According to the SE the completion of the programming came too close to the start of the current fortnightly SE dealing period on February 19 so that its testing had to be delayed until

the next period, from March 5.

The SE Council met last week to discuss letters from members about the scale of charges for

Talisman and decided to defer the final decision on charges until July when the system

should be in full operation. By the autumn about 90% of all stocks will be handled by Talisman.

The Council has already conceded that a reduction in the SE's general service charge to members could be made to compensate for the cost of Talisman (CW, February 19).

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GILB'S MYTHODOLOGY

Measuring program reliability



THERE are a number of myths about computer program reliability. One of these is that you cannot predict a program failure from an unknown bug. Another is that old and well-used programs such as computer suppliers' operating systems get more reliable with age. Myths like these are usually founded on ignorance of any real measures or measuring techniques, combined with "intuition," which unfortunately has not been a good guide in this area.

Reliability can have many definitions, depending on what you expect a program to do. Let us simplify for the purposes of this column and concentrate on measurements of program unreliability which reflect failure of the algorithm to produce expected outputs, according to other techniques, in order to make sure we have "enough."

It is at this level, high quality software, that the need for measuring accuracy becomes profitable; because if we are unable to measure accurately enough, that we have reached our program reliability goals, then we are in danger of severe cost and schedule overrun as we use an "overkill" of testing or other techniques, in order to make sure we have "enough."

We should establish at the outset that nobody knows how to construct a perfect program, nor how, in practice, to prove that an accidentally perfect program contains absolutely no faults for all possible inputs (including invalid ones).

Readers who know otherwise should share their knowledge with a wider public immediately.

If you think you know the answer, you almost certainly have not understood the question.

The interesting question then is the degree of reliability of a program. I find that very few data processing projects take the trouble to specify the degree of reliability that they intend to build into their programs before "declaring them finished." The usual practice is to let them go on the air when the failures are at a tolerable level. This practice is dangerous.

MTTF had risen exponentially to about 4.5 hours. The goal was a system with at least ten hours MTTF. The points plotted thus far corresponded to the model, which included a pair of standard deviation lines on each side of the main curve model.

Using the model one could estimate that the ten hours MTTF would be reached at about the 47th failure, and using the deviation lines one was warned that the earliest we could expect was after the 43rd failure and it could occur as late as the 35th failure. Naturally, we can use this data to estimate the number of hours the system must be run before we can expect to reach our reliability goal.

Michael Fagan's Inspection method (SM, p.57) has developed a predictive technique. The number of errors identified before testing, during inspection of source code and pseudocode, is calculated for individual modules on an error density per thousand lines of code basis. It has been shown that unusually high error density (for example 30 per 1,000 L.O.C., as opposed to 1 to 3) is an indicator of future high failure rates of a program. The program or module should probably be scrapped and rewritten by a sober programmer.

Another method used by John Musa of Bell Labs (New Jersey) is to plot the meantime to failure of a program on a graph against the failure number (1, 2, 3 etc. from some point in time). This curve is matched against a model curve of the gradual lengthening of the MTTF as more errors were uncovered. In one example he showed, after about 10 errors (handled one at a time) the

Bell Labs (EDPACS Feb. 1977, Jim Grimes) has also used file audit programs to measure program reliability indirectly in terms of errors in files.

There are other methods using artificial bugs (see SM, p.34) and multiple versions of the program, to check each other. In short, there are many ways of measuring program reliability.

SOFTWARE FILE-1

CAD bureau plans to use Unigraphics on DG Eclipse

WHAT is thought to be the UK's first full bureau service in computer-aided design is being set up by a precision engineering firm in Birmingham. To be called CAD CAM Computers, the bureau will use the Unigraphics design system owned by the US aerospace corporation McDonnell Douglas.

According to Lloyd-Roach, the system's accessibility to engineers was a key factor influencing his choice of it, which followed a lengthy period of investigation.

The originator of the scheme, David Lloyd-Roach, of Lloyd Roach Engineering, is planning to launch the service in about six months and is currently negotiating the purchase of a turnkey Unigraphics system based on a Data General Eclipse processor.

This will be supplied by United Computing Corp., the McDonnell Douglas subsidiary which

is at this level, high quality software, that the need for measuring accuracy becomes profitable; because if we are unable to measure accurately enough, that we have reached our program reliability goals, then we are in danger of severe cost and schedule overrun as we use an "overkill" of testing or other techniques, in order to make sure we have "enough."

One method of measuring the reliability of programs that has been used by TRW Systems is to take a representative sample (see page 24 of Software Metrics (SM)) of all possible input combinations, run them all and manually audit the results. If 1,000 test cases were run and three were incorrect, we could estimate with known uncertainty that 80.7% of another thousand random inputs would also be correct.

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Atkins buys Oxsys building system

TO reinforce its services in computer-aided design, W. S. Atkins has bought the Oxsys building system developed by Applied Research of Cambridge.

Flexible Easytrieve

FURTHER flexibility in I/O handling is the main feature of the latest release of Panosphic's Easytrieve, Version 8.

Among intrinsic enhancements are facilities for dynamic positioning within ISAM or VSAM files and greater control over record selection. Users can now handle character strings longer than 256 and variable length data fields with a single command.

Also announced was the first Easytrieve selectable unit, USIO, which makes it possible to access an unlimited number of sequential input or output files in a single Easytrieve job.

Sales and support in the Midlands, the North and Ireland are now being handled by a new Panosphic office in Manchester. A regional centre reporting to the London headquarters, it is located at Alpha House, Wythenshawe, Tel: (081) 436 1910.

Mini LP adapted for DG use

ORIGINALLY developed for the Digital Equipment PDP-11, the company's minicomputer linear programming package Mini LP has been adapted for use on Data General systems.

One of the first applications of

SOFTWARE FILE-2

Planning depot location

THE optimum location of a distribution depot is the problem addressed by the latest software to be released by Bell Analytic.

Called Depot, the program interface with Delton's vehicle routing and scheduling system (Software File July 6, 1978) and, like that, is available on the CICS or Services network as well as in-house.

According to Lloyd-Roach,

"The need for modifications was almost inevitable, he suggested, noting that he had never participated in installing a package without modifications.

On the subject of maintenance following the implementation, it was his view that the customer himself should be capable of maintaining the software — one common failing in packages is being insufficient involvement of the user client.

And although significant differences of opinion emerged, for example on the question of maintenance, it was possible for the chairman of the meeting, Hedley Voysey, to summarise succinctly the main thrust of the argument as a concern with total life-cycle costing.

While this was generally agreed to by the panel, it was noted by Levitan that it could lead to the phenomenon of the "second-time user."

"He bought that thing and it sure looked great. Nobody told him though that it didn't calculate sales commission — or whatever. In this, as in other cases, if you don't know the environment, you're going to get burnt."

"A package is intrinsically conceived and designed with the idea of installing it in many installations," noted Vince Wells, of RTE Computer Services. "It should be possible to modify its performance via parameters, rather than via coding alterations."

It was precisely the built-in flexibility of a package, he suggested, that could lead to savings in the cost of system ownership.

"For obvious economic reasons, an in-house system is not generally developed with the flexibility of a package. Yet the requirements for change in an in-house system are exactly the same as those already catered for in a package."

Levitan emphasised this point in a discussion on selecting a package.

"You don't simply call in all the vendors. The correct first step is to define your requirement, by identifying very specifically what you want from the system."

Only then, he said, was it possible to evaluate the usefulness of a package properly.

The value of application packages to the first time user

PROGRAMMER NOTES

Approach to testing

WHILE the last ten years have yielded a substantial crop of proposals for improving the structure of programs, it often seems that much less interest has been shown in the theory of program testing.

Indeed, there is a delicate suggestion in much talk of structured programming that the correctness of software is somehow ensured by adopting these methods, so that the need for testing is greatly reduced.

One strand in this discussion has been the notion that program construction and program analysis can be combined into a single process. Most often, this has focused on the technique of program proving and the use of assertions.

"The key point is that test cases can be developed and understood by persons who are not programmers. We can thus introduce into the verification process information that may not have been communicated in other forms before."

It was therefore interesting that a recent computer science paper should highlight some of the deficiencies of program proving in the course of expounding a novel (though somewhat abstract) approach to testing.

Both program proving and program testing, it notes, are methods of functional verification. They differ though in the way that information on the intended function is introduced.

In the case of proving, the information introduced in a pair of assertions, called pre-condition and post-condition, to the meaningful and adequate, those have to meet two important criteria.

"Firstly, they have to be strong enough to describe precisely the sets of input and output values and the correct re-

lationships between them. Secondly, the assertions must have a higher degree of authority as to the intent of the program than the program text itself. This cannot normally be expected if they are developed at the same time as the program and by the same person."

It is in this respect, the paper argues, that testing offers an intrinsic advantage, because it permits a high degree of independence between software writing and software verification.

"The key point is that test cases can be developed and understood by persons who are not programmers. We can thus introduce into the verification process information that may not have been communicated in other forms before."

"As investigations on programming errors have shown, the most prevalent errors are so-called design errors. These errors occurred when either the problem to be solved was misunderstood, or the knowledge of applicable solutions was inadequate."

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IT is exactly ten years since Software File first appeared. And although there have been many significant developments over the last decade, no one could deny that one of the most striking has been the continued strong growth of the packaged software market.

It was the enormous potential still projected for this market that was the main reason for the establishment of the NEB's software venture Insec two years ago. And since then, an even more voracious demand for software has stemmed from the exploding small business systems sector.

In addition, a substantial and rapidly growing market has opened up with the advent of ultra low-cost microprocessors and microcomputers.

With these trends in mind, Software File looks this week at software packages, with a report on last week's meeting of the Institute of Data Processing Management. The IDPM called its meeting "A software packaged future: are we getting value for

money?"

ALSO celebrating its tenth birthday (see panel left) is Zeus-Hermes, which has marked the occasion with a radical internal re-organisation.

This has created six independent operating companies under the wing of a holding company called Zeus-Hermes Investments. Aim of the move is to preserve the "small company" advantages up to now enjoyed in packages, instead focusing on practical issues.

While this was generally agreed to by the panel, it was noted by Levitan that it could lead to the phenomenon of the "second-time user."

"Packets have a way of turning themselves into bespoke systems," commented one of those attending. "The supplier then charges for modifying it as a turnkey system."

With this caveat, most of those attending felt that the value offered by packages was now compelling, and in one case at least — that of the payroll — was irresistible.

The company's traditional real time activities, together with growing microprocessor work, will be taken over by Zeus-Hermes Ltd.

Provision of turnkey systems, such as the accountant's system Pact, will be handled by Zeus-Hermes Computers, while commercial DP services, including the TP monitors Cortez and Cadiz, will be the responsibility of Zeus-Hermes Management Systems.

enterprise. It's relatively unregulated by the government, it's easy to enter the marketplace, and pricing is largely by supply and demand. Good products can be very successful, while products get a bad name, they don't."

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"It's up to the buyer to beware."

Echoing this warning, none of those speaking reacted strongly to the suggestion from the floor that packages could be a "soft"

way into software business generally

OP SPOT

THE manner in which a person dresses will, in the long-term, affect his attitude towards work. Thus, an operator who dresses in an over-causal or sloppy manner, will come to approach his operating in a similar way.

That view was put to me by a manager. It's an interesting thought, because at some sites the operators are allowed to please themselves, more or less, with regard to dress, while at others they are instructed to wear suit, collar and tie, and on no account to dress casually.

Contributing to this odd state of affairs is the fact that the computer room is a hybrid environment; it is neither office nor workshop, but a mixture of the two. At one moment the operator might be sitting at the console, dealing with a stream of system messages, and the next mounting a tape or disc, loading stationery on the printer or even cleaning that device.

So what sort of dress is right for the operator? In my view, the answer is smart but practical; comfortable but safe.

It might seem odd to relate

Do careless dressers make sloppy workers?

By Bernard Allen

dress to safety, but in the context of the computer room it is an important consideration.

Card readers, for example, are capable of digesting unusual forms of input, such as ties and long hair.

On one occasion, a friend of mine, an electrician, was working in the computer room when a girl's hair was dragged into a reader as she was inputting some cards to the device. Fortunately, he had the presence of mind to press the stop button and so prevented a serious accident. Nevertheless, her hair had to be cut, and she was taken to a local hairdresser who finished the job.

To me, that example is a sad reflection on the fact that, at

should remember that operators have to perform some rather dirty tasks during the course of their duties. Working the printers is the best example. It is usually the responsibility of the poor old trainee, who has to hump dusty boxes of stationery about, change ribbons and clean the devices in addition to responding to system requests for paper changes.

Some sites provide the operators with dust jackets, to be worn as they operate the printers. At installations where that is not the case, the management should think again, or, alternatively, award the staff an allowance to cover extra cleaning bills.

But I must take up my manager friend on his view that over-causal dress has an adverse effect on attitude. In my experience, that is not always the case.

The first, called Eye Tests for VDU Operators, is from the VDU Eye Test Advisory Group (Op Spot, February 1). It is a discussion document in which the group proposes a battery of eye tests for VDU operators.

For further information, contact Tom Stewart, VET

solves on the evening shifts.

Banks are notorious for collar and tie image - operators are expected to conform regardless of the job they do. At one such site we turned up for his shift dressed in blazer, trousers, but instead of a tie a string of brightly-coloured beads. The manager was in time in telling him just what bank expects from employees.

By way of contrast, operators at university sites have such interference from management. They are pleased to please themselves by regard to it goes a long way towards creating an atmosphere which pleases such installations.

Powerful processor

Nixdorf plans in Ireland

THE new IBM 3880 disc controller introduced with the IBM 3431 (CW, February 8), is a powerful processor which could be programmed as a back-end database system.

This has emerged from additional details revealed by IBM, which now says that the 3880 is based on a five million instruction per second eight-bit data word micro which uses 16-bit micro-instructions. The micro is an ECL

bipolar device which uses the same basic technology as the processor chips, and is made from a 1400-gate masterslice.

IBM says that because of its specialised control application, the instruction set consists principally of branch and register-oriented instructions.

The intrinsic power of the device leads observers to believe that the 3880 could form the basis of a back-end database system.

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PEOPLE AND EVENTS

Directorships for three Tesco men

In addition to Ian Bell (see page 5), three other Tesco computer men have been appointed executive directors.

Frank Farrell, 34, came into the group when the Victor Value grocery chain was taken over in 1968. Among the posts he has held is that of operations manager and he is now responsible for all technical functions, including the software and database groups, and the communications network.

Richard Gardner has been with the group 14 years, starting as a payroll clerk and then progressing through operations and programming departments. He is responsible for the operation of the sites at Cheshunt and Winsford, Staffs.

Joseph Strunka, previously head of technical programming systems at Hunting Engineering, has become a sales consultant, mechanical engineering, for Compdata.

Ian Denholm has been appointed territory manager for Systemsoft. He joins the company from ICL where he was a sales executive. Formerly a junior programmer with the Electrical Research Association, Jenny Boddy has become a junior analyst/programmer, and Howard Green a senior analyst, previously working for Metal Enclosures as a senior systems analyst. Ralph Jeffrey, formerly a senior programmer with the Milk Marketing Board, becomes a senior analyst/programmer, as does Louis Wong, a former consultant with Atkins On-Line. Until recently a programmer with Quadrant, Edna Gregory has joined the company as a junior analyst/programmer.

Dennis Thorn has become deputy chairman of SIS Computer Services. He was formerly finance director. Previously head of marketing, Alan Grig has been appointed managing director, replacing Gerry Pick.

Barry Sterndale-Bennett, formerly DP manager for the United Bank of Kuwait, has become business systems manager for McGregor Swire Air Services at Bracknell.

New address

SCIL has moved its premises in Edinburgh, as a result of the formation of the new company, Lloyds and Scottish Computer Services Limited, which will provide computing services to all group companies. Available as hardware will be the group's IBM 370/158 and other group computers throughout the UK. SCIL's new address is Northumberland House, 41 Northumberland Street, Edinburgh.

WHY GO TO TEXAS FOR A PORTABLE TERMINAL WHEN YOU CAN BUY A BRITISH ONE HERE

COMPACT 2 is the silent portable hardcopy terminal designed and manufactured in England. With its built-in acoustic coupler, you can get on-line to your computer within seconds wherever you are — all you need is a power point and a 'phone.

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By Judith Morris

Director for Prime

APPOINTED managing director of Prime Computer (UK) Ltd., subsidiary of Prime Computer, incorporated, which is based in Framingham, Massachusetts, US, Parsons joined the company last year from Honeywell, and since then held several positions including executive for Central London and the Home Counties. Her recent appointment is as marketing director. Her previous posts include project manager, and was responsible for installing the first TPS system in Australia.

Mary O'Toole has been appointed director of Harrison Computer Services (Ireland), with responsibility for the marketing and development of financial systems. She is promoted from her former position of consultant to Barry Grange, director of DP, who was appointed from the department. He in turn reports to Donald Harris, a main board director who was the DPM in Tesco's early days. Harris now deals with all computer operations and is also responsible for Tesco's 47,000 staff and general administration.

Norman Batty, James Boland and David Morgan have been appointed to the board of directors of Fargus Brothers. The company, a member of Macfarlane Group (Clanmarn), is the Glasgow-based manufacturer of office machine and computer ribbons.

Owen Dalton has been elected chairman of the Irish Computer Society for 1979. He is a senior executive of Hospital's Trust, and also a director of Memory, Ireland.

Edwin Monger has been appointed company secretary of Dicoll Electronics. He is a fellow of the Institute of Chartered Accountants and has looked after the interests of Dicoll Electronics for the past five years.

Nicholas Burrell has become a salesman for the North-East with BIS-Deltak. He was formerly a salesman for Rank Xerox, and has held similar positions with Rowntree Mackintosh and Yellow Pages. BIS-Deltak has also appointed two other salesmen, Bob Holtom and Stephen Mead. Holtom, who used to be a major accounts salesman with Rank Xerox, and has also worked for Cadbury Schweppes, will serve the Midlands. Mead will handle accounts in West London and the South-West. He previously dealt with national accounts for Rank Xerox.

If the NEB could find a buyer who was prepared to pay a premium on the ruling share price — perhaps Sir Arnold Weinstock's successor — it might well want to sell.

Duncan Black has been promoted from the position of product manager operations to managing director for Computer Bureau's subsidiary, the NCB. Previously managing director of the NCB, Robert Reid has become managing director in charge of product development.

The final message from Robin Rodin of the BBC was to urge users not to miss out on VME/B — which led neatly to the next speaker, Peter Turner, ex-ICL and now with Safe Computing.

Turner's message was that DMS makes moving to 2900 from 1900 or System 4 so easy that users may never take the VME plunge.

John Godley has left IPC Business Press to become managing director of Couchmed, the organising company for the Computerworld series of exhibitions. He was previously group advertising manager for Computer Weekly.

Sally Hoffman has been recruited as consultant to FMS. She was formerly a computer engineer with IBM UK.

Malcolm Chadwick has recently opened Matches Hall sales and service computer systems. He joined last year from CEC. He was systems sales manager of the technical.

Mike Ward, who used to be a systems programmer with KTC, also organises training for customers in the UK.

"The DME versus VME issue in the press exacerbates the problems of choice facing the user," he said.

"The terms mean that if ICL is to avoid repaying money to the government, it can only increase profits by increasing turnover, not by increasing margins.

"This is a severe handicap. It means that it cannot make a rights issue of shares to raise money without immediately increasing turnover, so any cash it needs must be borrowed. If I were on the board of ICL, I would do a deal with the government to get the pay-back millstone removed. It is not good for a company to be turnover-conscious rather than margins and profit conscious."

"User reactions were decided mixed, with one commenting that there might have been a 14-fold improvement in VME, but it still performed at only one third of expectations.

Consultant Fred Lamond commented that ICL designed "intellectually satisfying machines, and then expected them to be used in the 'right' way. Computers are a means to doing productive work. There is no point in converting if it is cheaper simply to get increased throughput by using DME."

"A buyer would be prepared to pay £200 million for this business alone, and get the manufacturing and sales businesses thrown in for nothing," he said.

"Big companies like BOC are increasingly looking at computer services, and the City

is at the other end. Free with every board comes Rapid Recall's unrivalled expertise and applications support. So why wait for add-in packages? Dial Rapid Recall today on (062 85) 27072.

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Roger Sterry has been appointed general manager of Jaserve's bureau services division. He was formerly operations manager, and has been with the company since its formation in 1971. Malcolm Hopping, promoted to the position of general manager of the company's business systems division, was most recently employed by BOC Datavoice as regional controller for customer services. Barry Briggs has left DEC, where he was a senior sales engineer, to become general manager in charge of sales and marketing of the Jaserve bureau and Jemini small business computer system.

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MICRO NEWS SPECIAL

If European governments fail to extend their current policies towards microelectronics to include the wider aspects of the use and development of information technology, some of the "horrific scenarios" of the impact of technology on employment could come to pass.

That is the view of IAN MACKINTOSH, whose company, Mackintosh Consultants, has an enviable track record over many years for projecting the impact and development of electronics and information technology. Mackintosh has played a significant role behind the scenes

in influencing policies throughout Europe, particularly towards supporting growth in microelectronics and related industries.

Although he applauds the UK government's lately acquired awareness of the importance of micros, he believes this is merely a case of catching up with the last

decade and that the future lies in the convergence of computing, telecomms and microelectronics into an integrated information technology.

In this exclusive interview with Martin Banks, Dr Mackintosh enlarges on his views on the development of IT.

The UK needs an Institute of Technological Planning

COUNTRIES and companies should be looking at how to exploit the services and products that are now possible by combining computers, telecommunications and micros. Emphasising this, Dr Ian Mackintosh points to the "automated office", and new media markets, using video discs and integrated video/computer terminals, as examples of areas for development.

Information technology, however, is a complex area, without the sudden simple and cataclysmic impact of some other more clearly defined technological breakthroughs. Mackintosh believes that there is a strong argument for establishing an Institute of Techno-

logical Planning in the UK and possibly elsewhere to provide a more coherent framework to replace the current "random" opinion-forming process.

This proposal is different from that of Inmos director Iann Barron who has, in the past, proposed the establishment of a Minister of Information Technology. Mackintosh's Planning Institute would be an informed advisory body rather than an executive arm of government.

Mackintosh emphasises the importance of such a body when he points out that although he remains optimistic that in the long run information technology will enhance human activities. "The next 20 years will be tough while people come to terms with technology."

He points to Japan, which has had a coherent approach to information technology for a decade, as an example of the number of new jobs that can be created, given foresight.

"Harnessing technology is now the great challenge", he says, suggesting that while the recent glut of government support for microelectronics manufacturing and microprocessor applications provided the right basic ingredients for the future development of UK industry, it was now very important that the government should turn its attention to the markets that will provide the necessary synergy for the semiconductor industry.

Mackintosh has been in the semiconductor industry since 1953 and was one of the earliest members of the brain drain when he went to Bell Laboratories in the US in 1956. By 1961 he was head of the Westinghouse microelectronics research division in the US. By 1964 he returned to become managing director of Elliott Automation Microelectronics, a new operation that for a while put UK expertise on a par with US manufacturers.

Among other milestones in his career, he was responsible at Elliott for the establishment of what was, to the best of his knowledge, the first significant MOS research facility in the world.

His career in the "front line" of semiconductors ended when the Elliott Automation group was taken over by English Electric, which already owned Marconi. This latter company had a new, large semiconductor plant at Waltham in Essex. Elliott's plant in Scotland was closed down.

Having found that locating venture capital in the UK was next to impossible once that the word semiconductor was mentioned, and following an unsuccessful attempt to start his own IC company, Mackintosh set up shop as a consultant specialising in this growing industry.

"Telecommunications, office products and computers, for example, are becoming so interrelated they are almost a technological continuum, and this will be the industry of the future."

A government attitude that followed these lines could do much that was positive in terms of future employment, Mackintosh felt.

In particular, he disagreed with the suggestions put forward by the Science Policy Research Unit in a report for the

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By

OWEN HANSON

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MACKINTOSH
... the next
20 years
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technology

only difference is that it is not as cataclysmic; it is more an evolutionary step."

One of the aims of a planning institute would be to encourage the development of entire industries that would be based on or make use of information technology. That, he felt, would then naturally provide the market-place for the now well-supported microelectronics industry.

Such industries include the obvious selection of consumer systems, telecommunications and office products, though Mackintosh finds a growing difficulty in drawing lines of distinction between some of them.

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MICRO NEWS

Conflict of interest behind AMC split



Motorola's Euro marketing move

DEDY SABAN (left) has been appointed marketing director of Motorola Semiconductors in Europe, based in Geneva. Saban first joined the company in 1962 as export sales manager. In 1968 he moved to Fairchild as director of international planning and in 1970 joined ITT Semiconductors as vice-president and worldwide director of marketing. Before rejoining Motorola in 1977 Saban held key posts with Cramer Electronics and Solid State Scientific.

Intel single board computer

A POWERFUL single board computer based on the 8086 CPU has been introduced by Intel. Called the ISBC 86/12, the board is claimed to be plug-compatible with the standard Intel Multibus and can be expanded using any ISBC expansion card, such as RAMs up to 64K bytes. The ISBC 86/12 comprises 18 boards.

Exchange clubs urged

VISITORS from about 30 countries will meet at Microsystems' 78th, the second annual exhibition and conference, aimed at bridging the technical gap between the makers and users of microelectronics (CW, February 8, 1978). It is thought that a new second source agreement between Siemens and Intel is imminent in which Siemens will have access to 8086 masks. Siemens will also develop peripheral circuits for the 8086.

Launch of user group

ADVANCED Micro Devices Inc and Siemens AG of West Germany have agreed to split up their joint venture company Advanced Micro Computers formed about 18 months ago (CW, October 13, 1977). The decision to split was made in August 1978. AMD signed a technical exchange and cross-licensing agreement with Zilog which enabled AMD to be an alternative 28000 supplier. AMD is believed to be developing certain peripheral circuits with Zilog.

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Dol backs TI 9900 course

AN INFORMAL meeting is planned for March 29 at Digitus, Dumbarton House, 68 Oxford Street, London W1, at 3 pm. The aims of the group are expected to include the provision of advice and information, the exchange of software and the provision of special offers and discounts on software and hardware. More details can be obtained from Alan Wood at Digitus. Tel: 01-946 5916.

A statement issued by both Siemens and AMD stated that the restructuring was appropriate in view of the different marketing objectives of the two companies in some areas of their respective microcomputer activities.

Two particular market areas the study highlighted were summer electronics and telecommunications. Both offer considerable potential for a European semiconductor industry to interact with, and in the case of telecommunications is largely protected market. This can give European companies a differential advantage over

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THE first real test of the government's reluctance to breach its own pay guidelines and comply with the results of a pay survey showing that the public sector has fallen way behind in the pay stakes was the one-day stoppage last Friday by the Civil and Public Servants Association and the Society of Civil and Public Servants. On the eve of this hammer-blow to what these two unions

view as the "rusty wheels of government machinery", Ken Thomas, general secretary of the CPSA, discussed with ROBIN WEBSTER the logic behind their decision to act now.

Why we are bringing the government of the country to a halt....

you and these must obviously be key people in essential areas.

With your eye to your responsibility, how much care are you taking to ensure that the effects of the strike do not have any long-term impact on what might be called "innocent" areas?

KT: We have made it absolutely plain that we are not going to affect the sick, the needy, the unemployed or the old. They are not going to be involved apart from the one-day strike. This is because the Civil Service is re-

sponsible for the proper running of the welfare state. The second thing is that after making sure that these areas are not disrupted, we are going to hit what is technically called "the machinery of government", but which I suppose can be better referred to as revenue collection. The effect, one would hope, and this is our intention, is that the ordinary man in the street will not be troubled significantly.

RW: But the real pity is that while the one-day strike is not to bring the country to a standstill, but to show our power, the importance of industrial action is its threat, not its implementation. I have desperately striven to use the threat of it to bring about a negotiating situation, any my regret is that I haven't been able to achieve that.

RW: What sort of co-operation have you had from other Civil Service and associated unions? Have they been optimistic or pessimistic of your chances of success?

KT: I don't think one can express it that way. Each union has to decide its own policy in relation to the will of its members. I never criticise other unions for this reason. As I said in one recent circular, my members span those who say, for example, that we should call a strike and stay out indefinitely, and others who somehow believe that sweet reason will always prevail. Now, I think the Civil Service trade union movement reflects those extremes. What we are doing, however, is to look at the bulk of our members, who, after all, have been balloted as the TUC concordat with government says this is the correct way to consult members. By 2 to 1 my members have said "We've had enough" and that is the ordinary lads, not the militants.

RW: At a recent meeting with Lord Pearn, Lord Privy Seal, you raised the point that the government brought independent pay comparison, in the form of the Pay Research Unit, back into action but as yet have refused to implement the results of the latest comparison survey. What was Lord Pearn's answer to this criticism?

KT: All he said was that they (the government) would be prepared to implement it but it would have to be staged and we should negotiate about staging. That really doesn't tell us anything. It seems like an advance but it really isn't. It is what we were told before; that we can have pay research back but we'll talk about its implementation. They said that 12 months ago and we have not got any further.

RW: But wasn't the agreement made on the basis that by bringing back the PRU, its research would actually be used in negotiations?

KT: It's as simple as that. Indeed, a pay board was set up to supervise the collection of the information and to ensure that nobody was on the fiddle. That pay board exists and is now examining all the evidence produced so that it can give a seal of approval a public declaration at the end which says that there

was no fiddle here; these facts were collected fairly.

RW: Details of your claims have been issued on the basis of the PRU results which you have analysed. How closely do the increases you are fighting for relate to the PRU figures? Are they exactly the same or some percentage amount?

KT: The effects of incomes policy over a whole range of people have been variable. I believe that the low paid suffered and I also believe that senior management suffered. In the middle range, somewhere or other, there is probably less effect seen. Because our system is sophisticated and complicated it is not easy for me to talk about a 14% increase or a 15% increase. What we do is to look at each grade in the Civil Service and

there is no fiddle here; these facts were collected fairly.

RW: So what you really are describing is a disease within the Civil Service, the symptoms of which are quite far advanced?

KT: Yes, that's right. What we are saying is that unless somebody actually applies some medicine to the situation in the Civil Service the patient will be dead. We will have catastrophic problems because whether people like it or not a large part of economic, social, and welfare life in the country is involved with government, and much of that day to day routine drudgery work has to be done by thousands and thousands of civil servants, whom the public basically dislike. Now if you haven't got staff to do that then

RW: What effect will all the troubles have on the development of the government as a total entity?

KT: I am sure that we are faced with a great shortage particularly in the highly technical areas such as programming, other data processing levels, and that stands very important too, because since computers started the Civil Service has been a very intelligent user of computers and is in favour of the use of computers in clerical work. Almost as an institution, we have computers than anyone in the world.

RW: So what you are fighting for then is better pay, better people, because of better pay and better development because of more people?

KT: Yes, what we are saying is that it's an old cry for those in the public sector, that we don't want to do any better than those in the private sector. We don't want to set ourselves up as an elite. What we are saying is that the private sector has tangibly broken through the pay barrier by all sorts of methods such as productivity bargains. So for the same work the private sector employees are doing better and while we don't want to beat them, we want to catch up. Many of my members have had it's a lousy system, you can't lead, and I have said to you never can lead in the public sector, but equally, you can't lead behind.

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Perkin Elmer adds to its menagerie

AN intelligent VDU workstation that can be programmed in Basic will be introduced later this month by the terminals division of Perkin-Elmer Data Systems. Called the Beaver, it comes with integral floppy disc storage, provides graphics facilities and costs less than £2,000.

The Beaver will be added to a group of Perkin-Elmer terminals with animal names—the PussyCat VDU output printer, the Owl VDU editing terminal, and Bantam, a teletype replacement model that costs less than £100 in quantities of 100.

Bantam features an LSI chip that was designed by Perkin-Elmer itself with the aim of dramatically reducing the total number of circuits in the terminal. The total is 19, compared with 100 in the earlier VDU model that employed a general purpose microprocessor.

Bantam, PussyCat, Owl and Beaver are otherwise known, respectively, as the 550, 650, 1200 and 3500.

Other Beaver features include a movable keyboard, a tiltable display, bi-synchronous communications and a range of terminal emulators.

The floppy disc storage takes the form of two microfloppy drives each holding 80K bytes. The Basic is ANSI standard with scientific and commercial extensions such as double precision arithmetic and string manipulation.

Called Level 61/DPS, the new system features an innovative dual-processor architecture, with a common resources processor, CRP, doing the computation, while a distributed resources processor, DRP, handles the peripherals and up to 16 workstations.

Each processor has its own

main memory and a ROM which constantly monitors the performance of the other. The CRP comes with 64 or 96K bytes of 16K bit main memory, and two pieces of microcode. One carries the 114 instruction set and test routines for the DRP, and the other contains resident parts of the operating system, test routines and integral disc controller.

The DRP has 24 or 56K bytes of main memory, and two more pieces of microcode. The first carries test routines for the CRP and the processor's 110 machine instructions, and the second, 8K bytes of supervisor memory.

It also includes diskette controller, synchronous line controller, and the asynchronous line adaptor for the 16 terminals.

The link between the processors runs at 50K bps, which can handle messages from all 16 workstations simultaneously.

The disc capacity ranges from 11 to 230 Megabytes, and the 61/DPS takes one or two printers, with speeds up to 160 cps and 800 lpm.

The operating system is a superset of GCOS-61, called GCOS 61/DPS, and supports three programming languages: Cobol and Fortran compilers and a Basic interpreter. A software suite designed to enable non-specialist users to adapt a set of basic packages to their

Saved from scrapheap

SCHOOLS in West Oxfordshire are to share a redundant IBM 1800 microcomputer which Southern GEC has been using for analysis work, but is now replacing. The 32K, 16-bit machine is being installed free in a classroom at Bartholomew

School, Eynsham.

Pupils from several nearby schools will be able to use the machine and have their first experience of hands-on computing, which the teachers feel will give a big boost to motivation among the children.

The increasing availability of 16-bit microprocessors poses a challenge to the System Designer about the suitability of longer word lengths and differences between manufacturers products.

This seminar examined the range of processors, considering selecting an M.P.U. and examining aspects of application.

The seminar is one of a series concerned with microprocessors and applications. Each seminar is relevant to designers involved in using microprocessors and will also be of interest to staff, university and college lecturers.

SEMINAR BOOKING:

JOAN SEATH,
THE NATIONAL COMPUTING CENTRE,
OXFORD ROAD,
MANCHESTER, M17 8QH
061-228 6551

THE company formed by the Post Office, Plessey, GEC and STC to export System X in the 1980s (CW, January 25) has been renamed United Telecommunications Ltd. No name was announced at the time of formation because the sponsors were hoping to use the name

in

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South Africa

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IBM replies on French investment

YOUR International Section (CW, February 15) carries a report on IBM's European investment in manufacturing, which warrants a reply.

First, the headline of the report, "IBM hits back by cutting French investment," leaves the casual reader with the impression that such cuts are a fact. That is simply not the case. IBM France's manufacturing investment has continued to

grow. Evidence of that is the 167,000 sq ft extension currently under construction at the company's Montpellier plant.

Second, you base much of your speculation about possible reductions in IBM's manufacturing growth in France and Italy on the fact that the IBM 4300 series is to be manufactured in Mainz, Germany, rather than in either of the other two countries.

These factors, among others, played a major part in our decision to manufacture the 4300 series at Mainz, a plant that has extensive experience of intermediate systems products.

You also say that the decision to build the IBM 4300 series in Germany is a "shot across the bows of the Italian government." May I point out that not only has IBM's manufacturing investment in Italy grown steadily over the years, but only two months ago IBM Italy announced its intention to build a new plant south of Rome.

If we can help any of your readers by discussing their needs we shall be happy to do so.

To: The Editor, Computer Weekly,
Borsell House, Stamford Street, London SE1 9LU

Training business systems analysts

ARISING from Owen Hanson's article, Training of Business Systems Analysts (CW, December 14, 1978), your correspondent Judy Cox raises some constructive points (Letters, January 18).

If a systems analyst aspires to be a business systems analyst it is essential, as she says, that he gains knowledge of business skills to augment and widen his technical training, and here we can be the problem. However, I believe we can offer a solution.

Principles of business and industry is the title of a course we have designed precisely to meet the demand of DP staff in this field, while we also offer O&M for systems analysts, dealing more specifically with the identification and solution of problems in the business environment.

Andy Howard
MSS,
Worthing

buffer is a window to the database.

On a 16-bit machine the size of this buffer, which is direct addressable, is limited (about 84 Kbytes), but we are implementing a disc cache technique which will increase it to about 800 Kbytes if required.

It is a new technique, and is used by other machines than Nord. Any claim to originality on behalf of IBM is as valid as the claim that IBM invented virtual memory!

The comments about screens and relational databases in Marketview should be taken with a pinch of salt. You can't get much on an 80-character line, independently of whether it is stored as tuples or records. Repeating groups are a normal "user view" of things and they can be and often are represented in the Codasyl and relational approaches without storing them as such in the physical record structure.

Query by example is an excellent screen-oriented interface to a database, but unless you have screens which can take much longer formats than 80 x 24, you will have considerable problems presenting all but the narrowest tables!

JEREMY SALTER
Norsk Data AS
Oslo



CONFERENCES

PEOPLE and Systems — "The Next Ten Years" is the theme of a conference on March 28-30 in Bournemouth. It is organized by the management services division of the Institute of Administrative Management. Booking details from Pamela Martin, Courses Department, Institute of Administrative Management, 205 High Street, Beckenham, Kent BR3 1BA.

An education co-ordination workshop will be held from March 19-23, at the Monkey Island Hotel, Maidenhead, Berkshire. It is organized by BIS-Delphi and intended for those whose work involves in-house training and career development programmes for data processing staff. Booking details from: The Royal, The Royal, BIS-Delphi Ltd, 17-23 Stamford Street, London SE1 9NG. Tel: 01-251 9799.

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MANAGINO changing technology is the theme of a one-day conference to be held at the Cafe Royal, London, on March 22, it is organized by BIS Applied Systems, and will examine various management approaches used to handle current changes in technology. Details from: BIS Applied Systems, York House, 108 West Bridge Road, London, Tel: 01-531 0233.

THE Scottish Business Show will be held from March 19-23 at the Kelvin Hall, Glasgow, organized by BIS Applied Systems, Industrial and Trade Exhibitions. Details may be obtained from: Ray D'Ursio, BETA, 108 Kingsway, London WC2B 5PU, or William Taylor, BETA, 24 Hardwicke Place, Edinburgh EH10 4LE.

Improve its working relationship with BASF storage media — the original

LETTERS

Can you help out this school?

THIS is a request to Computer Weekly readers to Heysham High School give enthusiasm and knowledge: some of the potential computing professionals of the late 1980s. Many of you must have had preparation and storage equipment which is out of date or not work. By giving us your typewriter, card punch, reader, verifier or even a about-to-be-updated computer you could help to give our young "hands on" experience of what makes these machines tick. If you think you can help, please contact me at the address below.

W. LOUIS
Heysham High School,
Morecambe LA3 1HS.

near Leeds, May 13.

The dates and venues for Thames North-West and East Anglia have still to be settled.

The Scottish heat will be at the Meadowbank Stadium, Edinburgh, on May 20 as long as sufficient teams in that area enter. There is also the possibility of an Irish heat in Belfast. If there are not enough teams for separate Scottish and Irish heats, contestants will be invited to take part in one of the other area heats if they wish.

All teams have to compete in the heats to win a place in the final except last year's winning men's and women's teams who have been given byes into the final.

Computastars is jointly sponsored by Computer Weekly and

Wright Air Conditioning, and organised by Computastars of 117b High Street, Croydon, Surrey. Tel: 01-688 6890.

Please circle appropriate centre.

In all matters relating to the rules and the competition, the decision of the organiser is final.

Please send this entry form to Computastars, 117b High Street, Croydon, Surrey. Tel: 01-688 6890.

Enclosed is £

to cover the entry fees for men's and/or women's teams

The team would like to compete in the following region NORTH EAST NORTH WEST MIDLANDS SOUTH WEST EAST ANGLIA THAMES NORTH WEST THAMES SOUTH SCOTLAND

Please circle appropriate centre.

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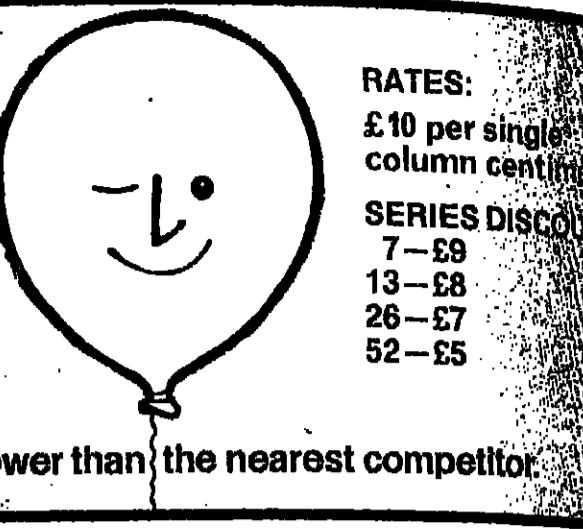
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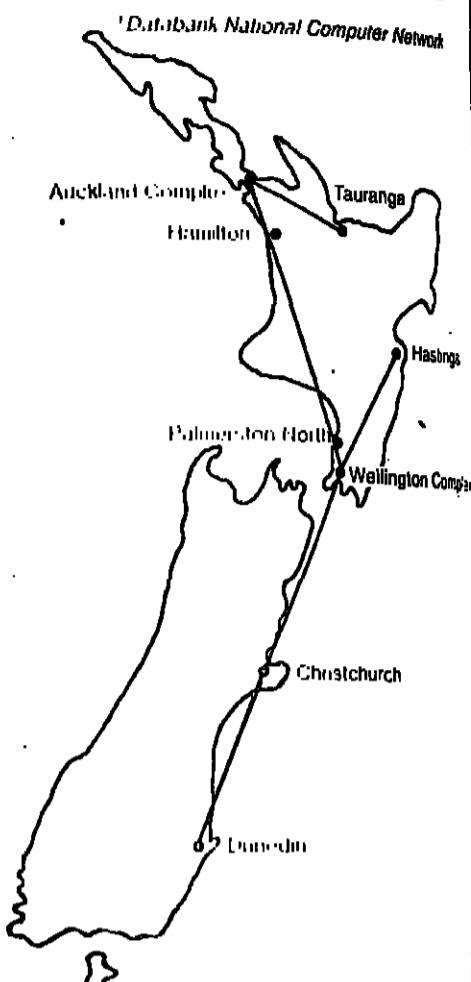
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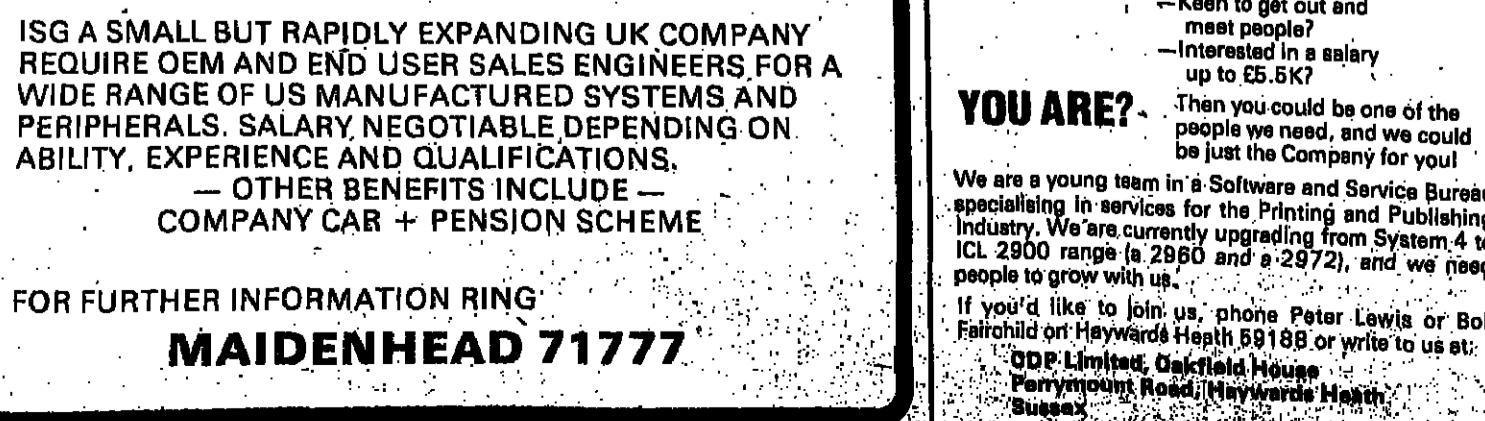
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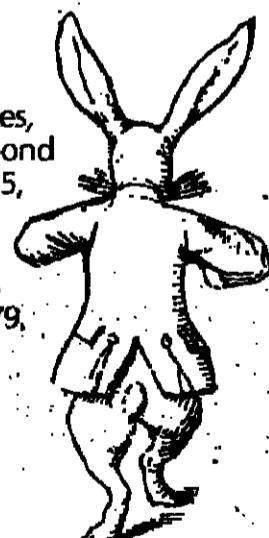
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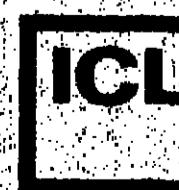
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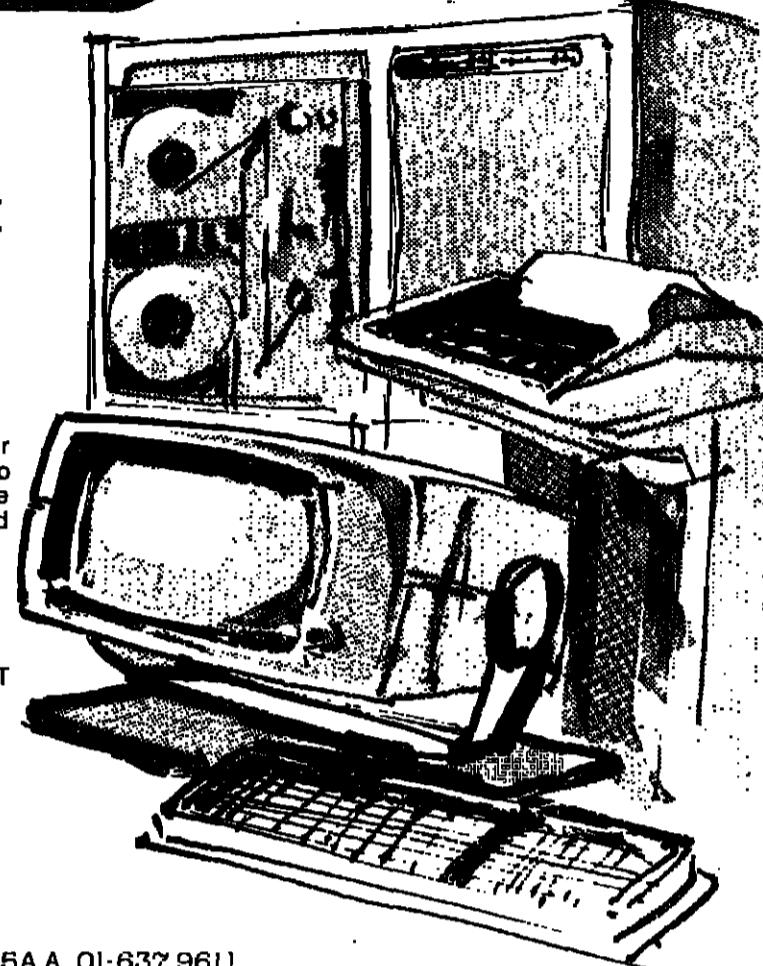
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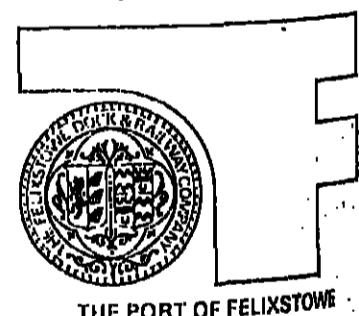


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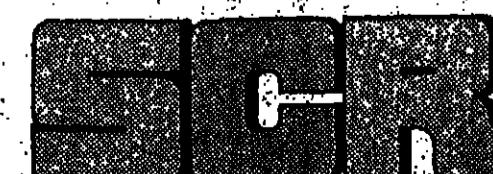
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For exciting large extensions to our two online systems.

The persons we are seeking will have at least two years' relevant experience in an industrial environment.

The company is offering a salary of up to £6,000 per annum plus 6 weeks annual holiday, non contributory pension scheme and free personal B.U.P.A. membership after appropriate service.

If you qualify for this challenging job please write in the first instance giving full details of age, experience qualifications and present salary to The Company Personnel Officer, (Ref. C.P. 2).

H. & R. JOHNSON LTD,
HIGHGATE TILE WORKS,
TUNSTALL,
STOKE-ON-TRENT,
STAFFS. ST6 4JX.
cristal

Technical Computing

The Research and Development Division of the British Railways Board at Derby wishes to strengthen its engineering computing team. The team is involved with a wide variety of technical computing work both as projects in their own right and as support for the various engineering departments of the Board. The areas covered by the team include:

Computer aided design and analysis using interactive graphics.

Support and extension of the finite element package.

Wide range of programmes and systems for experimental data capture and analysis.

Development and application of structural design and analysis techniques.

Mechanical/Electrical/Civil Engineering support.

The team has access to an IBM360/168 main frame computer, is responsible for the software of many mini computers and is beginning to be involved with micro processors.

Some experience of engineering or technical computation is essential. The minimum qualification is a degree or equivalent in Engineering, Mathematics or Science.

The commencing salaries for the junior posts will range from £2,803 to £4,583 plus additional payments for certain educational qualifications and for the more senior posts £4,740 to £6,184. There is a contributory Pension Scheme and the transfer of existing pension rights can, in most cases, be accepted. There are also free and reduced rate rail travel facilities.

Applications stating age, education, qualifications, experience and present salary should be sent to:

Headquarters Staff & Services Manager,
British Railways Board,
222 Marylebone Road,
London NW1 6JU
quoting ref: B113.

**Business Systems Analysts
Systems Designers
Programmers**

Bemrose UK Limited is a progressive company engaged in printing, packaging and publishing, employing 3,000 people across the UK, with a turnover of £40m. Group HQ is based at Derby, where vacancies exist within the Group Data Processing Department.

This department is currently expanding to meet a long-term plan to investigate, develop and implement new manual and computer systems for all users in the organisation.

Business Systems Analysts
responsible for providing the necessary business input to all aspects of systems concept, development and implementation.

Systems Designers
responsible for the design of computer systems utilising structured techniques.

Applicants for the above positions should ideally be educated to degree level and have at least two years practical experience of systems analysis and/or design in a computer environment.

Programmers
we are looking for programmers at varying levels, but candidates should have at least one year's working experience of COBOL.

We offer competitive salaries, four weeks holiday, and an excellent non-contributory pension and life assurance scheme. Relocation expenses will be available where appropriate.

Please phone for application form, or write enclosing CV to: Graham Bonnington, Group Personnel & IR Executive, Bemrose UK Limited, P.O. Box 52, Waygoose Drive, Derby DE2 6XP. Tel: 0332 81242

Bemrose UK Limited

A NEW START FOR A PROGRAMMER WITH A LOT OF POTENTIAL.

Warner Lambert manufacture a wide and well-known range of ethical and non-ethical pharmaceuticals, toiletries and confectionery.

The increasing importance of computers in the organisation of our business means we need to recruit additional programmers. People with a minimum of two years Cobol experience, preferably with an IBM or IBM equivalent machine.

If you qualify for this challenging job please write in the first instance giving full details of age, experience qualifications and present salary to The Company Personnel Officer, (Ref. C.P. 2).

The job involves writing program specifications, writing, testing and implementing programs and program modifications and helping out with program job difficulties where necessary for our IBM 370/138 installation. So if you're a quick thinker, a good problem solver and able to work efficiently without supervision,

WARNER LAMBERT
London

Programmer

Commencing salary around £4500

The Computer Section is responsible for developing and maintaining a variety of systems on the Council 1802 installation with communications equipment.

WE WANT

- A PROGRAMMER with about 18 months' experience in COBOL or PL/I.
- Experience of ICL 1800 but programme tested on other machines will be considered.

WE OFFER

- A starting salary around £4500 on a scale up to £5350 p.a. inclusive.
- An annual leave entitlement of 22 days plus one day leave per month.
- Pension scheme, subsidised staff restaurant, and other benefits.

● Programming for an interesting variety of applications. Current developments include systems dealing with accommodation for the elderly, superannuation records, children boarded out with foster parents, and the simulation of online interrogations for Housing rents.

● The opportunity to progress. If you show the initiative and ability necessary you will write programs, specification and design small systems under the guidance of an experienced Systems role.

Please contact John Allsop, Network Trainer, 1st Floor, Department, 22-28 Chancery Lane, Fleet Street, London EC4P 4EE. Tel: 01-478 3020 extension 507 or 508.

Redbridge
London

MIDLANDS/WEST COUNTRY**D.P. Recruitment Specialists****MANAGEMENT, PROJECT****MANAGERS, SYSTEMS ANALYSTS**

PROJECT LEADER at least 8 years in Commercial D.P. Systems to lead Project, reporting directly to Systems Manager. Experience with On-line CICS, Software packages, using ICL 1800 hardware an advantage. Area: Birmingham. Salary: c £6,000. Ref: SA110.

COMPUTER MANAGER required to run large Mini using C.P.U.'s and V.D.U.'s. At least 2 years' programming in Basic+ or similar language. Area: Birmingham. Salary: c £6,000. Ref: M48.

SYSTEMS EXECUTIVE at least 5 years in D.P. to advise clients on Systems development and participate in selling. Working knowledge of numerous applications required. Area: West Midlands. Salary: c £6,000 plus expenses. Ref: P64.

SYSTEMS MANAGER with at least 5 years in D.P. including Real time, Database and Time sharing applications in both Mini and Mainframe environments. Area: Nottinghamshire. Salary: to £7,000. Ref: SA215.

SYSTEMS ANALYST at least 4 years' experience using IBM or ICL hardware. Area: Nottinghamshire. Salary: c £6,000. Ref: SA169.

PROJECT LEADER at least 4 years in Commercial systems. Area: Gloucestershire. Salary: £8,000. Ref: P18.

PROJECT LEADER at least 4 years in Systems Analysis and Design together with a formal Cobol programming background using ICL Hardware. On-line and Batch applications essential. Area: Birmingham. Salary: £8,500. Ref: SA167.

PROJECT LEADER at least 4 years' experience in financial applications especially Order Processing or General Ledger. Area: West Midlands. Salary: package around £9,500 plus liberal car and mileage allowance. Ref: SA219.

SYSTEMS ANALYST required by International Mini-computer manufacturer for Pre and Post sales activities. They would be required to specialise in implementing software packages. A formal programming background is required plus minimum 2 years' Systems Analysis. Although the position is based in Birmingham, cover of the Midlands area occasional travelling throughout the U.K. would be required. Salary: to £9,500 plus Bonus and Car allowance. Ref: SA201.

SENIOR SYSTEMS ADVISOR for main frame manufacturer. At least 4 years' experience in main frame systems including knowledge of Cobol or RPG II. Area: Leicester or Bristol. Salary: c £8,000 plus generous expenses. Ref: SA129.

SYSTEMS SUPERVISOR. At least 4 years in Analysis and Programming in RPG II. Knowledge of stock control or order processing applications an advantage. Area: Redditch. Salary: to £8,000. Ref: SA190.

SYSTEMS CONSULTANT. Experienced with IBM small mainframe and Mini. Language RPG II. Area: Gloucestershire. Salary: To £6,000 and Commission plus car. Ref: SA191.

SYSTEMS ANALYST. At least 3 years' experience using IBM System 3 hardware. Area: Nottinghamshire. Salary: To £6,500. Ref: SA208.

SYSTEMS ANALYST. At least 2 years' Systems design with programming background. Knowledge of Database and Real time an advantage. Area: Nottinghamshire. Salary: To £6,000. Ref: SA198A.

PROGRAMMER. At least 18 months' Programming in Cobol PL/I or Assembler. Area: Anderton/Burton-on-Trent. Salary: £6,500. Ref: P367.

SENIOR SYSTEMS ANALYST. At least 4 years' Commercial applications experience. Knowledge of Cobol. Area: Lincolnshire. Salary: £6,500. Ref: P410.

JUNIOR SYSTEMS ANALYST. Around 12 months' systems experience Area: Birmingham. Salary: to £5,500. Ref: SA210.

PROJECT LEADERS & SYSTEMS ANALYSTS. Owing to expansion our client is seeking D.P. Personnel at various levels. Area: Coventry. Salary: £6,800 plus general relocation package. Ref: SA124.

ANALYSTS/PROGRAMMERS

ANALYSTS/PROGRAMMER. At least 3 years' experience for IBM Systems 34. RPG II an asset but not essential, mainly Systems development work. Area: West Bromwich. Salary: To £6,000. Ref: P377.

ZAMBIA ANALYST/PROGRAMMER. At least 3 years' experience using IBM System 34 hardware. Minimum period of contract 2 years. Salary negotiable plus expenses. Ref: SA180.

TECHNICAL SUPPORT ANALYST/PROGRAMMER. At least 2 years' experience in commercial applications including Production Control, Mini manufacturers. Area: Birmingham. Salary: c £6,000 plus company car and expenses. Ref: P377.

DATA PROCESSING ANALYST/PROGRAMMER. At least 2 years' experience in Data Processing in Cobol. Area: Cannock. Salary: c £6,000. Ref: P390.

DATA PROCESSING ANALYST/PROGRAMMER, at least 2 years' experience in Data Processing in Cobol. Area: Cannock. Salary: c £6,000. Ref: SA220.

ANALYST/PROGRAMMER. 2 years' Cobol. Any hardware. Area: Wolverhampton. Salary: c £6,000. Ref: P411.

PROJECT LEADER. At least 4 years in Systems Analysis and Design together with a formal Cobol programming background using ICL Hardware. On-line and Batch applications essential. Area: Birmingham. Salary: £8,000. Ref: SA180.

ANALYST/PROGRAMMER. 1 year plus Cobol or willing to learn experience in programming in Cobol. Area: West Midlands. Salary: package around £9,500 plus liberal car and mileage allowance. Ref: SA219.

SENIOR COMPUTER OPERATOR. At least 18 months using IBM OS DOS V.3. Area: Birmingham. Salary: £6,000. Ref: D149.

SENIOR COMPUTER OPERATOR. At least 18 months operating IBM OS DOS under DOS/V. Area: Birmingham. Salary: £6,000 plus package. Ref: D168.

COMPUTER OPERATOR/DATA CONTROLLER. At least 2 years' Operating/Data Control experience. Any hardware. Area: Gloucestershire. Salary: c £4,000. Ref: O159.

COMPUTER OPERATOR. At least 2 years' Operating ICL 1800 or 2900 Area: Shropshire. Salary: £4,000. Ref: O158.

CHIEF OPERATOR. At least 4 years' operations experience using ICL 1800 range under Executive and Office H. ability to supervise staff at various levels. Area: Gloucestershire. Salary: negotiable. Ref: O160.

NETWORK CONTROLLER, experienced in on-line network control. Area: Gloucestershire. Salary: Negotiable. Ref: O161.

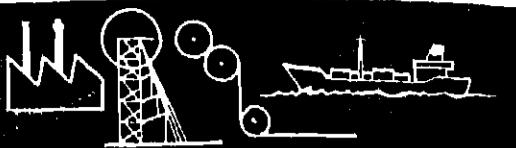
Contact: Graham Aston, M.I.E.C.I., MARTINS COMPUTER SERVICES

First Floor, Western House, Smulbrook, Queenway, Birmingham BS4 4HQ. telephone 021-643 2111. 24-hour answering service. Evenings and weekends 021-643 0311.

We are now able to interview via telex 021-320 0000 and Satel 021-320 0000 by appointment.

**Sales Executives – income package c£14,000 P.A.**

NORTHERN APPOINTMENTS



IN taking a look at the opportunities in data processing in the North it is worthwhile considering the general market situation as a prelude to looking more specifically at the area.

In general terms the market-place appears very good from the point of view of an applicant seeking a new position, be it in operations, programming, systems analysis or sales.

With the exception of senior management positions, where the competition is always intense, there would certainly seem to be more jobs on offer than candidates to fill the vacancies.

When considering the opportunities in any area and acknowledging the shortage of experienced personnel, it is worth mentioning the major features for which candidates are looking in a job.

I would suggest, not necessarily in order of priority, that the major features to be considered are:

1. — The general background, which includes job content, career path, equipment, technical content and the level of commitment of top management to data processing.

2. — The financial considerations, including salary levels and the value of those rewards to the recipient.

If these criteria are satisfactorily met, even in today's market-place, candidates of good quality can

always be found, although this can require considerable effort on behalf of consultants or client companies alike.

How then do the job opportunities in the North measure up to these key criteria?

To deal first with the general background, the North does not lag behind any other sector of the UK in these respects. Throughout the region there are numerous examples of very progressive companies which are at the forefront in the use and continuing development of the latest technology.

There is a comprehensive range of installations covering all the main hardware — mainframe, mini and including quite extensive use of distributed processing techniques. Thus in technical terms there is no difficulty in satisfying any particular candidates so far as the hardware with which they wish to work is concerned.

Acknowledging that candidates can have a preference for a particular manufacturer's equipment, the major consideration in

any company's data processing department must be the aspect of service to the organisation, and the types of organisation in the region should be mentioned.

There is a wide spread of commercial, financial and industrial organisations, and therefore considerable scope for professional staff

manufacturing systems. The retail trade is well represented, including chain store operations, multiple retailing and mail order. As some of the major names in the country are located in this region, the retail trade accounts for some major installations which represent some of the

remainder of the type of opportunities in the region. It is important to consider carefully the financial aspects.

Much has been said and written about the differences in salary levels in different parts of the country allied to the cost of living in various areas. In general terms the cost of living is definitely lower in the North and house prices, particularly compared with the Greater London commuter area, are much lower and offer better value for money.

Hand in hand with this goes the distance commuted and the significant cost of doing. Generally in the North people seem to live much nearer their place of work, probably because they do not need to go a long way away to be able to buy a house in pleasant suburban or rural surroundings.

Underlining the differential in respect of housing costs is the fact that my own organisation is frequently contacted by candidates who wish to move North, often because at the early stages of their

career and married life is the only opportunity they have of being able to afford to buy a house.

It is dangerous to

make categorical statements about salaries because it seems that whatever the salary one quotes it can always be proven wrong in a subsequent advertisement. However, as a guide the following are I think reasonable market indicators: Programmers (1 year Cobol), about £4,300; programmers (2/3 years), about £5,000/£5,300; senior programmers (5 years), about £6,000; systems analysts (3 years DP), about £5,500/£6,500; senior analysts (5/6 years DP), about £6,300/£7,000.

Obviously, using a generalisation such as "North of England" there can be considerable variation in these figures, but they represent the level that needs to be offered and which candidates can reasonably expect to receive.

Various additional factors also come into play, including productivity bonus

While it is possible to discuss salary levels in general systems development terms

the quality of life is good and the environment is clean.

Finally,

it is my view, the North is able to offer a wide choice of jobs involving most types of hardware and covering a range of systems applications that suit most people's taste.

It is an area with much to offer over and above work, and speaking as an immigrant from the South, no longer believe that world ends socially and economically passing the Yorkshire Moors.

Whilst the majority of the vacancies we are seeking to fill come within the systems development function there are also vacancies for senior operations personnel.

Salaries will be offered which reflect the qualifications and experience of the successful candidates. In addition in a number of cases attractive bonus schemes are in operation and if relocation is necessary expenses will be reimbursed.

IT IS THE POLICY OF IVOR NORTON MANAGEMENT SERVICES LTD TO OFFER A FREE RECRUITMENT SERVICE TO ALL CANDIDATES WHO ARE UNEMPLOYED AND REGISTERED WITH AN EMPLOYMENT OFFICE OR LOCAL AUTHORITY. WE ARE ABLE TO OFFER A FREE CONSULTING SERVICE TO ALL CANDIDATES WHO ARE EMPLOYED AND ARE LOOKING FOR ANOTHER POSITION. WE ARE ABLE TO OFFER A FREE CONSULTING SERVICE TO ALL CANDIDATES WHO ARE EMPLOYED AND ARE LOOKING FOR ANOTHER POSITION.

A number of clients located throughout the North of England who are major computer users have a requirement for staff at various levels of experience within most of the following job categories.

There is a wide range of vacancies and the hardware covers most of the major manufacturers.

IT IS THE POLICY OF IVOR NORTON MANAGEMENT SERVICES LTD TO OFFER A FREE RECRUITMENT SERVICE TO ALL CANDIDATES WHO ARE UNEMPLOYED AND REGISTERED WITH AN EMPLOYMENT OFFICE OR LOCAL AUTHORITY. WE ARE ABLE TO OFFER A FREE CONSULTING SERVICE TO ALL CANDIDATES WHO ARE EMPLOYED AND ARE LOOKING FOR ANOTHER POSITION. WE ARE ABLE TO OFFER A FREE CONSULTING SERVICE TO ALL CANDIDATES WHO ARE EMPLOYED AND ARE LOOKING FOR ANOTHER POSITION.

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We will be bringing the opportunities to you by holding informal interviews at major centres throughout the North of England all next week. Please call at your most convenient location and ask at the hotel reception for Ivor Norton between 4.30 pm and 9.00 pm on the dates shown:

LIVERPOOL

Monday 5th March 1979
Holiday Inn
Paradise Street
051-709-0188

MANCHESTER

Tuesday 6th March 1979
Portland Hotel
Portland Street
061-228-3400

NEWCASTLE

Wednesday 7th March 1979
Swallow Hotel
New Gate Street
0632-25025

LEEDS

Thursday 8th March 1979
Metropole Hotel
King Street
0532-450841

UNABLE TO MAKE IT

If these dates and times are inconvenient or if you prefer to arrange a formal appointment please telephone Harrogate 66628 (reverse-charges) or write stating job interest and preferred area to Ivor Norton Management Services Ltd., FREEPOST, Harrogate, HG1 5BR. We will then arrange to meet you at a mutually convenient time and location.

FOR CANDIDATES NOT RESIDENT IN THE NORTH

In the next few weeks we shall be visiting various locations throughout the UK and if you are considering moving to the North of England or would like to find out more information about job opportunities in the North please contact us by telephone or FREEPOST. We will then arrange to meet you for an informal discussion either about these vacancies or to advise you generally about the career opportunities and general amenities in the North. Our help and advice is free.

Small Business Systems Manager

PACKAGE £15,000-00+QE

Our client is a very well established International company with an enviable record of success, both world-wide and in the UK, in the small business systems field, and wishes to recruit a Regional Manager to be based in Leeds.

The Company is well established with an excellent customer base which is rapidly expanding. The products are amongst the best in their field and are recognised throughout the industry as competitively priced.

The rewards for the successful candidate, in addition to job satisfaction and the opportunity for personal career growth, will include a remuneration package of not less than £15,000, which for an outstanding candidate could be considerably more, plus executive car, BUPA, Pension and sickness benefits. If appropriate expenses will be reimbursed.

This is a very senior position and interested candidates should contact Ivor Norton with full career details quoting reference CW/79011 to arrange an initial discussion. Complete confidentiality is assured and no details will be disclosed without the express permission of candidates.

Ivor Norton Management Services Ltd

RECRUITMENT CONSULTING DIVISION
P.O. Box 62

52 Shaftesbury Avenue, London W1V 7DE Tel: 01-734 8862 (24 hour answering service)

Coppull Tower House, Harrogate HG1 1TS Tel: Harrogate 66628

Ivor Norton Management Services Ltd

RECRUITMENT CONSULTING DIVISION

P.O. Box 62 Capital Tower House, Harrogate HG1 1TS Tel: Harrogate 66628



NORTHERN APPOINTMENTS

KNIGHT COMPUTER PROGRAMMING SLIPPERFIELD LIMITED

NORTHERN OPPORTUNITIES

COBOL PROGRAMMER
NORTH-WESTCOBOL PROGRAMMER
NORTH-EAST

SYSTEMS ANALYST

COBOL PROGRAMMER



Our client requires a COBOL programmer with three minimum of 18 months' experience and an IBM background to work in their Data Centre in the North-West. On-line, OSVS1 or CICS experience would be an advantage. Applications are commercial and an annual bonus is offered. Ref. 1091

SYSTEMS PROGRAMMER
NORTH-EAST

to £5712

MONTH END

to £7200 SYSTEMS ANALYST

COBOL PROGRAMMER

COBOL PROGRAMMER

A Systems Programmer is required to join a technical support team who are at present supporting an over-loaded system. New ICL hardware is being introduced to alleviate the system. This major conversion requires programmers with ICL, VME/B and COBOL experience. A lucrative productivity bonus is offered. Ref. 1021.

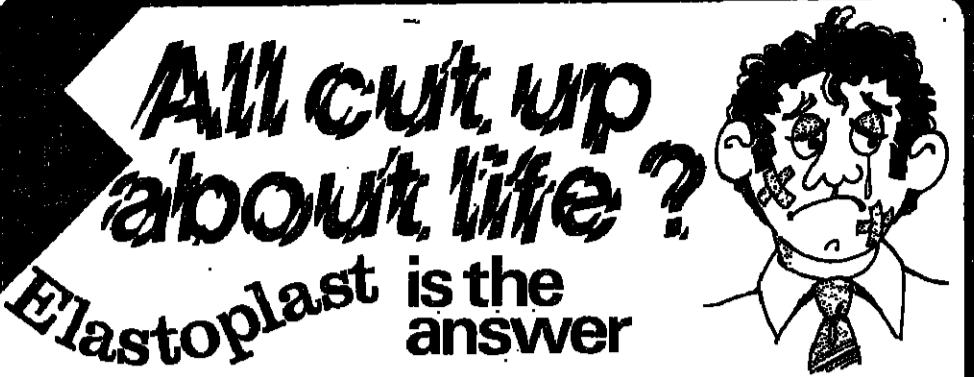
FOR DETAILS OF THESE AND OUR OTHER VACANCIES PLEASE CONTACT JOAN JOHNSTONE
143/144 ROYAL EXCHANGE, MANCHESTER.

TELEPHONE NO. 061-833 9341/5

DATA PROCESSING RECRUITMENT SPECIALISTS

COBOL PROGRAMMER

COB



Excellent salaries
+ paid overtime

HULL

Our client, T.J. Smith & Nephew Limited, makers of Elastoplast and many other well-known products, have embarked upon a major on-line/real-time systems development programme for their Univac 90/60. Thus they are seeking a number of experienced staff to bolster their existing team.

In addition to some attractive financial benefits, these positions offer the following desirable features:

- * NEW ON-LINE SYSTEMS
- * ON-LINE PROGRAM DEVELOPMENT
- * A HIGH DEGREE OF PERSONAL RESPONSIBILITY
- * FULL TRAINING, AS REQUIRED

Hull offers excellent city, country and coastal amenities, with plentiful and reasonably priced housing. Assistance with relocation is available in appropriate cases.

TO FURTHER YOUR CAREER, TELEPHONE (TRANSFER CHARGES, IF NECESSARY) OR WRITE TO ARNOLD SAMPSON (NO STAMP REQUIRED).

INITIAL INTERVIEWS WILL BE HELD SOON IN HULL, MANCHESTER OR LONDON.

Sampson Staff FREEPOST, Manchester M1 8DL. Tel: 061-832-4184. Evenings and Weekends — Tottington (020488) 2545.

Systems Co-ordinator

Central Lancashire, c. £7,000

A subsidiary of a major British group, our client manufactures and markets capital equipment for use in breweries, dairies and related industries. The company, which will install a computer later in the year, is undertaking a comprehensive review of its operational systems and has created this new position to co-ordinate the design, development and implementation of the new systems. Reporting to the Managing Director,

C.G. Moores, Ref: 24150/CW.

Male or female candidates should telephone in confidence for a Personal History Form to: MANCHESTER: 061-236 8981, Sun Life House, 3 Charlotte Street, M1 4HB.

Hoggett Bowers
Executive Selection Consultants
BIRMINGHAM; CARDIFF, GLASGOW, LEEDS, LONDON, MANCHESTER, NEWCASTLE and SHEFFIELD.

Quality of Life ON LINE + RURAL LINE + CHARM

Ellesmere, Shropshire.

This is one of those rare opportunities to get out of the rat-race, yet not move into a computing backwater. Our client is R.J. Fullwood & Bland, an international company who are market leaders in the manufacture of milking machines and bulk storage tanks. They run a dual Burroughs installation consisting of B1800 and B800 processors, with on-line and database applications, and on-line program development.

These machines were installed in 1978, primarily for the introduction of on-line production and inventory control systems. These systems will be linked to the existing on-line order processing system. These developments have created the need for further programming support, to augment the existing small team.

COBOL PROGRAMMERS
Two experienced Cobol programmers are required, to work on a variety of development and software tasks. A minimum of 1 year's Cobol experience is necessary, on any machine, as Full Burroughs training will be given.

Ellesmere, in Shropshire's Lake District, offers a superb environment for family life, with easy access to and from most areas of the North West, Wales and the West Midlands. Housing is plentiful and reasonably priced, and assistance with relocation will be given, where necessary. Salaries are attractive, and will depend on experience.

To improve your quality of life and job satisfaction in one go, telephone (transfer charges if necessary), or write to Arnold Sampson ASAP. Interviews will be held quickly in Ellesmere, Manchester or London.

Sampson Staff FREEPOST, Manchester M1 8DL. Tel: 061-832-4184. Evenings and Weekends — Tottington (020488) 2545.

TEESIDE POLYTECHNIC
Department of
Computer Science
Applications are invited for the posts of:

**PRINCIPAL
LECTURER
and
LECTURER II/
SENIOR
LECTURER**

The vacancies arise from the expansion of this well-established department and internal promotions.

Applicants should have good academic qualifications, a strong interest in teaching computing, and, preferably, some industrial or commercial experience.

For the Principal Lecturer post candidates should have a specialised knowledge of a non-numerical branch of Computer Science.

Salary: Principal Lecturer £7047-£7818 (work bar) — £8844. Initial appointment may not be made above £7818.

Lecturer II/Senior Lecturer £6101-£8051 (efficiency bar) — £7085 (work bar) — £7572. Appointment will be made within the range £6101-£8051.

Application forms and further particulars are available from the Staffing Section, Teesside Polytechnic, Borough Road, Middlesbrough, Cleveland, TS1 3BA, and are returnable within 14 days of the appearance of this advertisement.

THE POLYTECHNIC HUDDERSFIELD
DEPARTMENT OF COMPUTER STUDIES AND MATHEMATICS
RESEARCH FELLOW
(Fixed term two year contract)
Ref. ACA/288
Applications are invited from graduates with relevant research experience in good honours degree and probably higher degree, in related information systems.

The successful candidate will be expected to register for a higher degree with the Council for National Academic Awards. Salary: Research Fellow Burnham Scale (Point O SL Scale) £851. Research Assistant Burnham Scale (Point O LT Scale) £3192.

Further details and application forms, which should be returned by 23 March, 1979, from the Personnel Office, The Polytechnic, Queen'sgate, Huddersfield HD1 3DH. (Telephone 0484-2280, Ext. 2226).

Excellent salaries + paid overtime

Hull

Our client, T.J. Smith & Nephew Limited, makers of Elastoplast and many other well-known products, have embarked upon a major on-line/real-time systems development programme for their Univac 90/60. Thus they are seeking a number of experienced staff to bolster their existing team.

In addition to some attractive financial benefits, these positions offer the following desirable features:

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INITIAL INTERVIEWS WILL BE HELD SOON IN HULL, MANCHESTER OR LONDON.

Sampson Staff FREEPOST, Manchester M1 8DL. Tel: 061-832-4184. Evenings and Weekends — Tottington (020488) 2545.

HALTON BOROUGH COUNCIL
CHIEF FINANCE OFFICER'S DEPARTMENT
POST NO. 84
**SENIOR
ANALYST/
PROGRAMMER**
Salary up to £6508 per annum inclusive

Applications are invited from experienced computer users for this post which is required to complete a small development team working on both existing and new systems, including on-line enquiry systems for the council. The position will take charge of systems from investigation to implementation and negotiating with user departments.

The council's ICL 2904 with EDPS 605, magnetic tapes, direct entry has recently been enhanced by the addition 7602 communications equipment.

The post is based in Widnes and a system of flexible working hours is in operation. The council will be willing to reasonable removal expenses and make available an appropriate place, accommodation to the successful applicant.

Application forms are obtainable from the Head of Finance and Management Services (Tel: 051-424 2061 Ext. 148); should be returned not later than 14th March, 1979.

R. TURTON, Chief Exec.

Municipal Building Kingsway, Widnes WA8 7AF

For an application form in respect of this and many other vacancies please contact Miss Val Halliwell, Victoria Appointments Limited, 24 Mosley Street, Manchester 2. Tel: 061-236 7319 (24-hour answering service) and 061-236 7417 or home 061-440 8134.

NORTHERN APPOINTMENTS

VICTORIA APPOINTMENTS LIMITED

BELOIT WALMSLEY LTD.

Senior System Analyst

Salary £5,900

Junior System Analyst

Salary £5,000

This International Manufacturing Company now wishes to recruit a Systems Analyst to be responsible for the design and implementation of a new Financial Project to be set up on Database.

The successful candidate will have a good business background, preferably with experience of manufacturing and financial applications. He/she will be highly self-motivated and User Orientated. This post represents an excellent opportunity to gain project management experience.

For the Junior Systems Analyst post we are seeking a programmer wishing to progress into Systems Analysis or alternatively a candidate with 6/9 months' systems analysis experience to join the manufacturing team engaged on the development of on-line systems.

The installation operates an IBM 370/138 (currently under review) using DL/I Database and pursues a comprehensive training policy.

The Company offers excellent terms and conditions of employment, together with usual benefits expected from a large company.

REF. CW 10279.

For an application form in respect of this and many other vacancies please contact Miss Val Halliwell, Victoria Appointments Limited, 24 Mosley Street, Manchester 2. Tel: 061-236 7319 (24-hour answering service) and 061-236 7417 or home 061-440 8134.

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• DATA PROCESSING
• FULL CURRENT DRIVING LICENCE

For further details Contact:

John Royle
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Further particulars and application form (available by March 31) from the Regional Officer, The University, M13 9PL.

Post available as soon as may be arranged

Applications are invited for the post of Senior Lecturer/Lecturer in Computer Microelectronics.

Applications are invited for this post in the Department of Computer Studies. The successful applicant will possess a higher degree and have considerable experience in one or more of the following fields: Integrated Circuit Design, Computer Architecture, Digital Logic, Microprocessor design and use. The ability to lecture is essential and the successful candidate will be required to teach a wide range of subjects in the field of computer science. Lecturer salary within the range £3,683-£7,564 p.a. Senior Lecturer within the range £7,564-£10,754 p.a.

Further details Contact:

John Royle
Master Resources Ltd.
Langley House,
Langley Park,
Warrington, Cheshire, WA2 7AA
Tel No.: Warrington 532127

Further particulars and application form (available by March 31) from the Regional Officer, The University, M13 9PL.

Post available as soon as may be arranged

Applications are invited for the post of Research Assistant to join a departmental group working on distributed operating systems. The current research interests include the design and implementation of a distributed operating system on a mixed micro/minicomputer architecture. The successful candidate will be involved in the implementation of the system using batch, sequential and concurrent processing techniques. It is essential that the candidate has a good honours degree in computing with an interest in software engineering and the theory of computation. Previous experience in distributed systems and/or parallel processing would be an advantage. The successful applicant will be required to work on a CUA research project. This will be a fixed term appointment for three years. Required for an interview during March/April. To apply send full details of experience to the Recruitment Officer, The University, M13 9PL.

Salary: £2516-£2530

Applications are invited for the post of Research Assistant to join a departmental group working on distributed operating systems. The current research interests include the design and implementation of a distributed operating system on a mixed micro/minicomputer architecture. The successful candidate will be involved in the implementation of the system using batch, sequential and concurrent processing techniques. It is essential that the candidate has a good honours degree in computing with an interest in software engineering and the theory of computation. Previous experience in distributed systems and/or parallel processing would be an advantage. The successful applicant will be required to work on a CUA research project. This will be a fixed term appointment for three years. Required for an interview during March/April. To apply send full details of experience to the Recruitment Officer, The University, M13 9PL.

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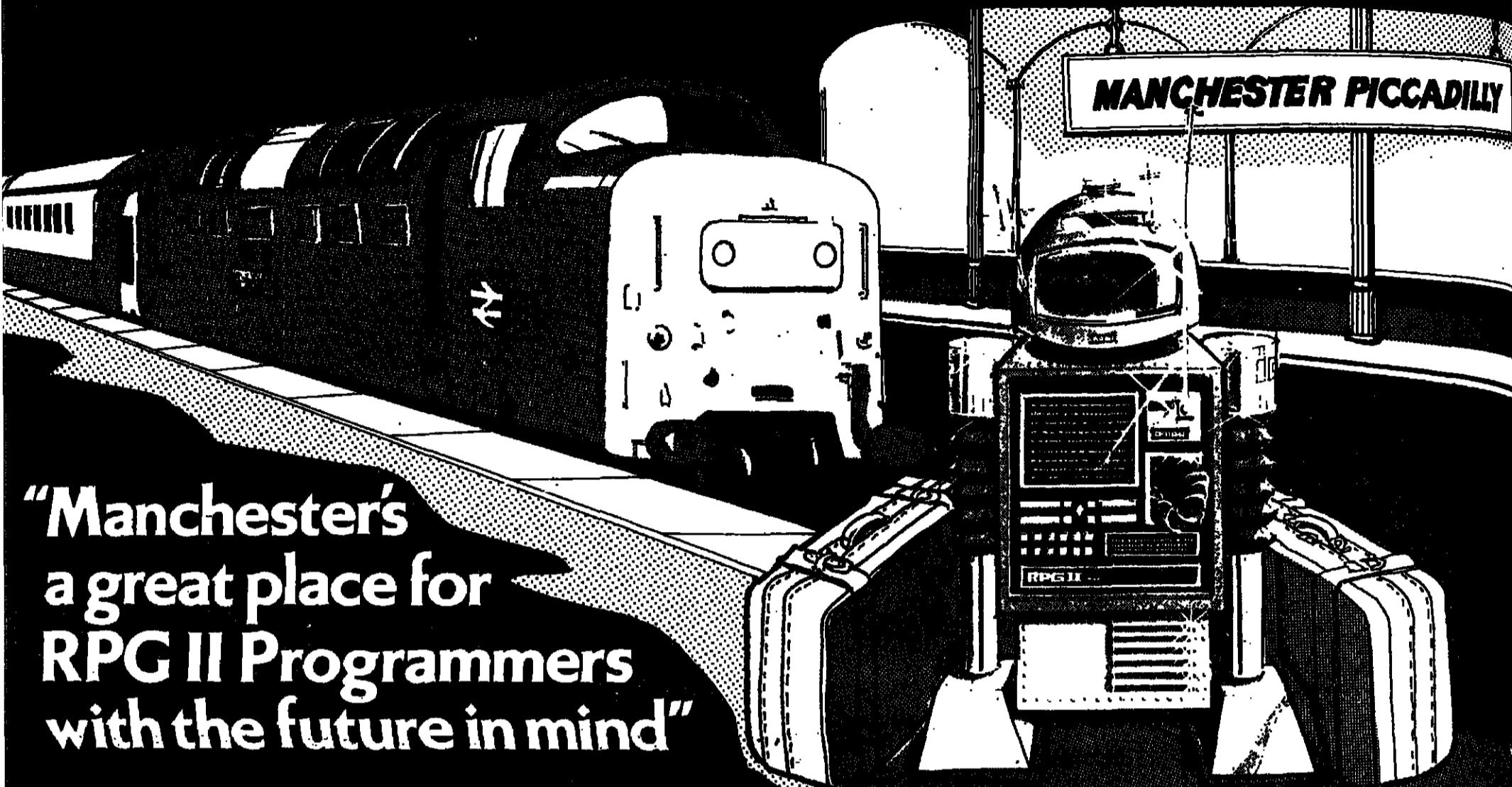
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Wilkinson Match Limited, a large international Company, manufactures and distributes a wide range of consumer goods which include such famous names as Wilkinson "Sword", Bryant and May, and Foster Grant. The Data Processing Department (based at High Wycombe) is currently developing a large on-line order processing and accounting system, using IBM hardware, and has the following openings, each offering excellent career prospects:

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from £6,500 p.a.

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There are opportunities for all levels of computer professionals from Programmers with 1 year's experience to Systems Analysts and Project Leaders with 5+ years' experience.

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Applications range from financial processing, as custom-built systems and packages through to advanced on-line, real-time, message switching and compiler development.

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If you wish to be based overseas, our clients in Europe and the Middle East are seeking to fill similar positions.

Ref: 9/1

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£4142 per annum rising to £5305 per annum

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(Inclusive of Shift Allowance)

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We have an ICL 1903T under G3 taking care of our normal commercial processing needs. We have four CTL Modular Is, a Prime 300 and PDP 11s.

The PDPs will meet the real time needs of local Oxford Hospitals and plans are in hand to develop real time systems for Blood Transfusion Services and Area Stores. All in all, there's a lot going on at Oxford!

But we can't do it on our own. We need you to help us and in return we can help you to develop your technical and managerial skills.

O.K. so maybe we can't pay the highest salary in the market place, but a nice working environment, interesting work,

and a good personal development and management that cares is worth a great deal; probably a lot more than more money!

If you are interested in having a look round the RCU, ring Sharon Edmunds on Oxford 64861 Ext. 357, or for an informal chat about the posts, contact either Bob White, Ext. 884, or Alan Sand Ext. 563.

For further details and an application form, please ring quoting reference number V30/79: The Recruitment Officer, Oxford Regional Health Authority, Old Road, Headington, Oxford.

Tel: Oxford 64861, Ext. 243/387.

Oxford Regional Health Authority

Contract Spot

COBOL PROGRAMMERS

Central & S.W. London

Phone Paula on 01-946 4424
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Grade Tech 4/5

£24500-£25368

Successful applicants will possess a minimum requirement, working experience in IBM 360 COBOL, assembly language and JCL and dump reading skills. Of these applicants, preference will be given to those who have experience in on-line IMS (DL/I) programming. Consideration will also be given to OS COBOL experience, especially with any of the following: DL/I data base design, IMS (DL/I) batch programming, CICS, PL/I and Assembler.

Salaries from £7k to £13k depending upon level of experience, plus relocation/reimbursement expenses.

Interviews will be conducted in London from March 3 to March 15. Applications may be made by telephoning Ralph Payne at 01-937 8170 (March 3 to March 9) or by post. Interviews will be held in Birmingham, Kent, and Clacton-on-Sea, Essex, and the Clacton-on-Sea area.

Information will be provided in the interview.

Application forms and further details from the Borough Engineer and Surveyor, Technical Office, Stanley Road, Harrow Hill, Romford, Essex RM3 8BU.

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SYSTEMS ANALYSTS

City to £7000

A major finance company based in the City wishes to recruit additional staff to work on the development of new projects for their expanding IBM 370 system. The individuals they are seeking will have at least two years Analysis and must have implemented one major system. Any knowledge of CICS or PL1 would be a distinct advantage. In addition to a highly competitive starting salary the company offers an attractive benefits package and excellent working conditions.

Reference PG 9/1

COBOL PROGRAMMERS

City to £6000 + Mortgage

A major financial organisation with an expanding ICL 2900 system is seeking several COBOL programmers. These positions will be ideal for people with 12 to 18 months experience on any mainframe, and who want ANALYSIS prospects.

The company offers high starting salaries, Season Ticket Loans, Flexitime and a Subsidised Mortgage.

01-439 7871

Reference PG 9/2

COMMERCIAL FORTRAN

North London to £7500

A large international company has undertaken a number of new development projects in the commercial and Real-Time fields, and so require several programmers with at least 2 years' experience in commercial applications using Fortran. Any Real Time experience would be of interest but this is not essential since full training will be given. The company offers varied and interesting work coupled with a full range of company benefits.

Reference HK 9/3

JUNIOR FORTRAN PROGRAMMERS

West London to £4500

A well known company in the Consumer industry currently needs several Junior Programmers who wish to build for their own future. The minimum experience required is just 6 MONTHS FORTRAN programming on any mainframe or mini. Training in Systems Analysis will be provided and exposure to mainframes (an IBM 370/138), mini computers (on Prime 300's) and micro machines, will all ensure a wide range of experience and a 1st class choice of career prospects in the future.

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Reference HK 9/4

IBM & ICL MAINFRAMES

IBM SYS 3 £6000

Operations Manager required for International company based in W. London. Minimum of 4 years system 3 experience essential.

IBM 370 OS £5500

2 years + experience, including some JCL knowledge required for this senior Op/Shift leader post.

IBM 370 OS £4300

Operators with 6 mths + experience required by busy installation based in the city. Unusual shift pattern giving plenty of free time.

IBM 370 DOS £4500

Bureau in central London requires an operator with 1 yr + DOS experience. Perks include pension scheme and annual Bonus.

IBM SYS 3 £4200

Operator with 1 yr + experience for 2 shift, working SYS 3/16 site.

ICL 1900 £4000

City based installation requires an operator with 1 yrs experience preferably on GI II. 2 shifts only and annual Bonus.

ICL 2900 £4250

Shift leader required with 2 yrs + 1900 or 2900 experience, by company based in N.W. London. 2 shift working only and some company product discounts.

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East London to £3800 + BONUS

Our Client, the east London Computer Centre of a large Service Organisation requires operations staff with 8 months 1900 experience. The hardware at present consists of a 1904A running under GII, A. A replacement 1904S, is planned later this year with a 2900 next year.

The company can offer excellent career prospects, to ambitious operators. There are opportunities for proficient staff to move off shift into Programming, Production Control or Technical Support after a period of 2 years.

Other benefits include a quarterly productivity bonus scheme, opportunities for overtime, subsidised staff restaurant, pension scheme, and midweek rest days etc.

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Minimum of one years experience for senior operator on a large 68 system. Pleasant location and career prospects are excellent.

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18 months experience required for company in N.W. London. The main advantage of this position is no night shifts.

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At least three years experience needed for Senior Operator in an Installation in C. London. A thorough knowledge of 1100 series is necessary for this no night post.

UNIVAC QS 3 £4300

Senior operator with 18 months experience using OS3 is required for a fast developing site with two shifts.

NCR B1 £4000

Six months experience needed for junior operators post. All banking perks apply and no night shifts.

NCR ANY £4200

An operator with 18 months good NCR experience who is ready for the CRITERION range is required for 3 shift job.

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URGENTLY REQUIRED IN ALL AREAS.

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For further details call

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datascene Recruitment Ltd.

Sceptre House

169-173 Regent Street

London W1R 7FB

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Computer Services Association

Ref: 9/5

PL1 PROGRAMMERS

West End to £5500 + Mortgage

A leading commercial organisation with an expanding 370/138 installation in the West End is seeking a number of PL1 programmers to work on a variety of new and existing projects.

The positions are ideal for enterprising young programmers with at least twelve months experience on IBM Hardware. A knowledge of OS/VS1, although not essential, would be a distinct advantage. The company offers a first class salary, and fringe benefits include Flexitime, Season Ticket Loans, and a Subsidised Mortgage.

Reference PG 9/6

RPG II ANALYST/PROGRAMMERS

City to £8000 + Mortgage

RPG II people at all levels are needed for this financial company based in the City. The experience required varies from 18 months to 5 years, covering PROJECT LEADERS, ANALYSTS and PROGRAMMERS.

TP and Data Base work will be involved, promotion prospects are superb, and benefits include LV's, Free Pension, Season Ticket Loans, and Subsidised Mortgages.

01-439-7871 Reference PG 9/7

PDP 11 PROGRAMMERS

London & Home Counties to £8000

If you have had at least 3 years' experience of programming on PDP 11's we have many vacancies which will be of interest.

Your experience should include programming in either BASIC+/BASIC+2 ASSEMBLER or FORTRAN under RSTS, RSX11 etc.

Applications vary from highly technical to commercial and telecommunications.

All positions offer excellent salaries combined with the opportunity to progress in your particular field.

OPERATIONS

LONDON, W.1 £5700-£6200

Acting for a large West End ICL installation, we are recruiting for two management posts, with sound career prospects, in a well-organised environment with good working conditions. There will be a cost of living increment as from next April.

OPERATIONS SUPERVISOR

DAY SHIFTS ONLY — 5-DAY WEEK

You would be responsible for the efficient operation of two ICL 1800s with two shifts of operating staff. However, you would not be required to work shifts, but you would need to be reasonably flexible in your working hours.

You will probably have had at least five years' operations experience, including supervision, together with a thorough knowledge of 1900 Manual, Executive and George 2 operating systems.

The post might well suit an older applicant who sees his career developing later into general technical management. (Ref. 998)

SHIFT CONTROLLER

TWO SHIFTS ONLY — 5-DAY WEEK

You would be responsible for two shifts, operating a large ICL 2900 configuration under VME/B. There is substantial use of communications, including both TCP and MAC, and IDMS is being introduced.

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IBM**IMS COBOL PROGRAMMERS MIDLANDS****IMS PL/I PROGRAMMERS NORTHWEST, MIDLANDS****370 COBOL PROGRAMMERS NORTH, MIDLANDS****CICS PL/I PROGRAMMERS MIDLANDS****ICL****1900 FILETAB/PLAN/COBOL PROGRAMMERS NORTH, MIDLANDS****1900 COBOL GII/GIII PROGRAMMERS MIDLANDS, NORTH****2960/70 VMEB/MEK COBOL/FORTRAN PROGRAMMERS NORTHWEST, MIDLANDS****2903/4 COBOL PROGRAMMERS MIDLANDS****OTHERS****BURROUGHS PROGRAMMERS MIDLANDS, NORTHWEST****HONEYWELL 66 PROGRAMMERS MIDLANDS, NORTH, SCOTLAND****UNIVAC COBOL DMS PROGRAMMERS MIDLANDS, NORTHWEST****POP FORTRAN CORAL 66 PROGRAMMERS MIDLANDS****SYSTEM ANALYSTS ENGINEERING EXPERIENCE MIDLANDS****HONEYWELL COBOL GCOS PROGRAMMERS SCOTLAND, NORTH, MIDLANDS****PDP 11 BASIC PROGRAMMERS MIDLANDS**

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Inclusive of supplement

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For application forms please contact:
The Personnel Department, Council Offices, Duttons Road, Romsey, Hampshire (Tel: Romsey 516117, ext. 42).

Closing date for return of completed application form Wednesday, March 14, 1979.

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Xoren Computing Ltd.
28 Maddox Street
London W1R 9PF
Telephone: 01-829 5932



STERLING DISTRICT COUNCIL FINANCE DEPARTMENT SYSTEMS ANALYST/ PROGRAMMER

Salary scale: AP1/II £3,561 to £4,245
(inclusive of supplement)

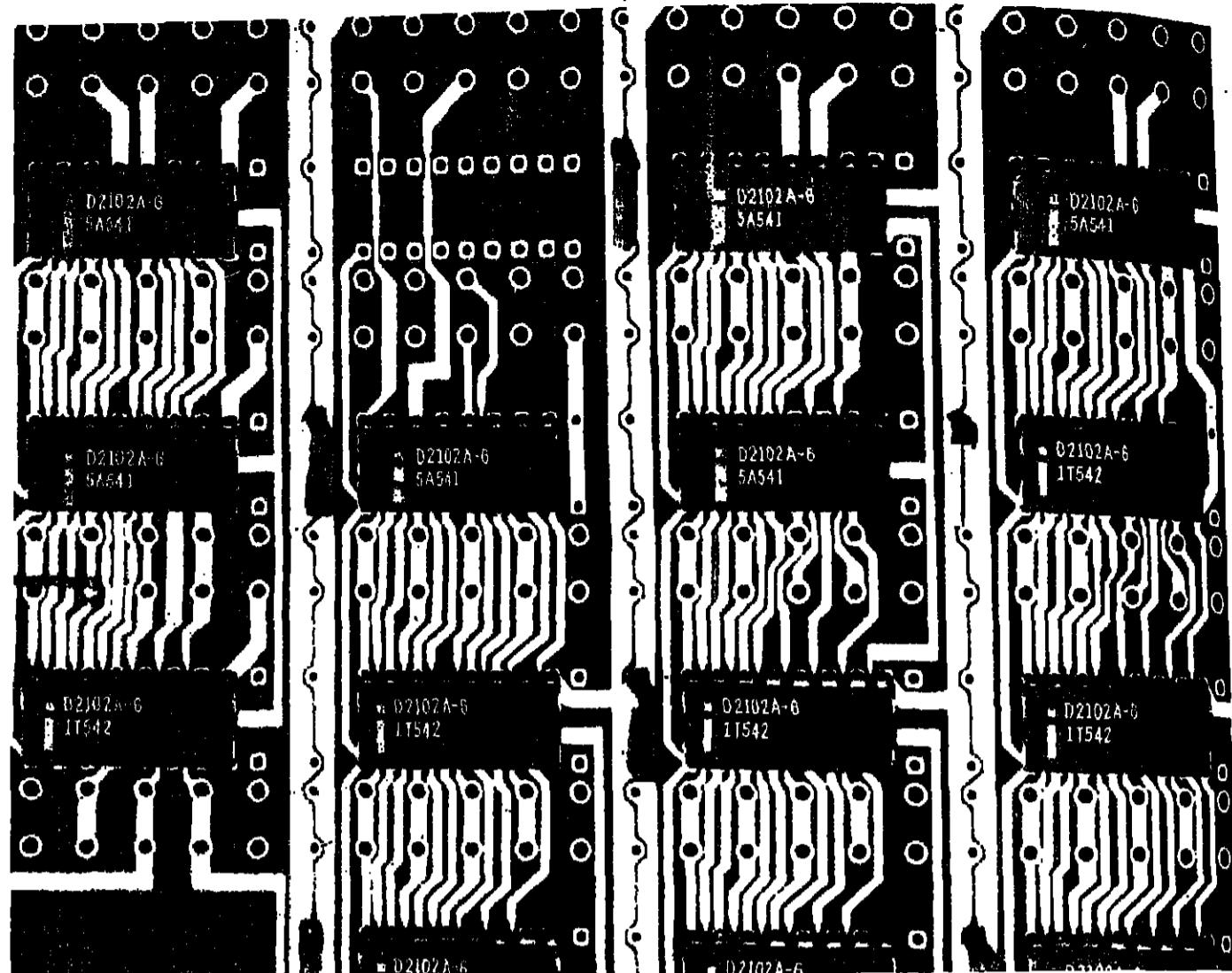
Applicants should have a good working knowledge of COBOL and experience of GCOS 81 would be an advantage. The successful applicant will be expected to assist in the design and implementation of new applications. The council operates a HONEYWELL 61/80 which will probably be replaced by a LEVEL 62/25 in the near future.

Applications quoting, age, experience and names of 2 (two) referees to be forwarded to:

The Director of Finance
Municipal Buildings
Sterling FK8 2HU

Not later than 14th March, 1979.

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CW/8/1

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For further details and a confidential discussion contact the advertising consultant.

CW/8/2

RPG II IBM S 38

High Wycombe Commencing £6,000

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In addition to gaining experience on this new hardware, the successful programmer will have the opportunity of moving into Analysis work at an early stage.

Circa 2 years' experience of programming including RPG II is required for this post. Experience of manufacturing/commercial systems is desirable.

A competitive salary is offered for this level of experience as well as the various fringe benefits expected from a modern company.

CW/8/3

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They are embarking on the development of a large European Distributed Data Processing Network, which will require the establishment of Regional Centres at strategic points throughout Europe, to which will be linked many outlying sales offices, plants and warehouses. The installations will be based on HP 3000 series.

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CW/8/4

Swiss Based Worldwide Travel Opportunities Real-Time Software for Process Control Software Specialists £14,000-£18,000

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CW/8/4

Overseas Appointments

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to £7,500

Our clients, one of the longest-established companies in the computer peripherals business, are seeking an experienced SYSTEMS ANALYST to assist with the development of commercial applications in a rapidly expanding computer department.

The successful applicant will have at least 3 years' experience of commercial systems within a manufacturing environment, and should have experience of at least one major project from feasibility study through to implementation.

The installation is based around ICL mainframe in the 2800 range, and therefore ICL experience, though not essential, would be an advantage.

On account of the planned expansion within the department this appointment offers very good opportunities for advancement.

CW/8/5

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Dublin

Up to £9,000

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- Design and implementation of a wide range of commercial systems.
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Interested applicants, who should have the capability to progress to project leadership should telephone Jim Corrigan on Dublin 789577.

CW/8/6

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SENIOR PROGRAMMER

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The post is seconded to the City of London Polytechnic Computer Centre.

It is essential that applicants should have sound programming experience and an interest in educational computing. Preference will be given to those with good academic or professional (BSC) qualifications.

Further details and application forms obtainable from the Education Officer (EO/East 1B), Room 307, County Hall, London SE1 (Please enclose a stamped addressed envelope).

Forms to be returned no later than 16 March 1979.

Programmer/ Analyst

to £6000

Cryoplants Limited, a member of the BOC group of Companies, are leaders in the manufacture, construction and commissioning of low temperature process plants.

We are currently looking for an experienced Programmer to join our 'Systems' team. Candidates should have either some analysis experience, or be capable of progression to a programmer/analyst.

The successful applicant must have at least one year COBOL 'OS' experience, and experience of IBM 370.

Some knowledge of MINI Computer on-line systems will be an advantage, however, appropriate training will be provided in this.

Datapoint equipment is currently in use at Cryoplants providing on-line local systems whilst continuously linked to a 370/158 MP configuration.

A competitive salary, based on experience, is offered, together with other benefits befitting a large Company, which includes generous non-contributory sick pay scheme, 20 days' holiday per year, good contributory pension scheme.

Please write or telephone for an application form, to:
Personnel Officer, Cryoplants Limited,
Angel Road, Edmonton N18 3BW

Cryoplants

HERBERT NUMERICAL CONTROLS LTD DEVELOPMENT OPPORTUNITIES with H.N.C.L. at WOKING

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The first development will be a partly distributed, multiprocessor system implemented with the latest nMOS devices, including the 8086. We envisage that this will require the development of small control units and a sophisticated centralised module with disc and VDU.

Candidates should be keen to extend their abilities and be prepared to be fully involved with all aspects of the project, be under 30 and qualified to degree or HND with at least two years' experience in one of the following activities:

MICROPROCESSOR SYSTEM DESIGN

— ideally with experience of 8080/85 and MDS systems.

SOFTWARE DEVELOPMENT/ PROGRAMMING AND ANALYSIS

— ideally with DP and control systems experience with Mini Computers.

HARDWARE ELECTRONICS DESIGN

— with industrial or military systems experience.

The salary is negotiable up to £8,500 and benefits include a 4½-day week and help with relocation expenses where appropriate.

Please apply, enclosing a.c.v., to: Personnel Department

Herbert Numerical Controls Ltd.
Boundary Road

Woking, Surrey

Or discuss the opportunity with the Project Engineer concerned — Mr. Terry Eds.

Office hours: Woking 86678 — Home No. Brookwood 6503.

COMPUTER PROGRAMMER

Required by NALGO. Salary within range £4926-£5754 p.a. plus £312 p.a. supplement and £435 p.a. London Weighting according to experience and qualifications. To work on ICL 2904 (40K, Tapes EDS 60s and DDEs). Applicants should have had two years' experience of Cobol.

Staff restaurant. Minimum 23 days annual leave and additional leave at bank holidays. Partial mortgage interest rebate.

Application form from the General Secretary, NALGO, 1 Mabledon Place London WC1H 9AJ.

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Required by International company offering £7K. Usual large company benefits including pension scheme, four weeks holiday, career development plus opportunities for European travel.

Applicants should have four years' experience with IBM OS hardware, the ability to modify an OS/VS operating system, knowledge of assembly language and of IBM OS utilities, facilities and JCL. French and/or German would be an advantage.

For early interview, telephone 01-405 0654 quoting ref. JE/549. DRAKE SENIOR APPOINTMENTS (Consultants), 121 Kingsway, London, WC2B.

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A vacancy exists for a Programmer with experience in IBM COBOL to OS/VSI. Knowledge of JCL would be an advantage.

Employment benefits are those associated with a large engineering company and include subsidised canteen, four-weeks' annual holiday, pension and life assurance, sick pay scheme, active sports and social club.

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OF COMPUTER STUDIES
(GRADE III)**
Applications are invited for the above post, based at Elstree Way, Boreham Wood, which becomes vacant from 1 May, 1979.
Applicants should be graduates with wide industrial computer and teaching experience, and preferably a teaching qualification.
Further particulars and an application form from the Principal at the above address, to be returned by Monday, 19 March.

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- City
- On-line systems

Our client, dataSTREAM International, provides on-line computer based information services to financial organisations in the UK and Europe via a teleprocessing network based on an IBM 370/168. Increasing demand for these services leads to a need for systems analysts to work in the following areas:-



Systems Analyst

Fixed Interest Securities

Experience in this field would be preferred but experience as a system analyst on general financial systems would be acceptable.

Systems Analyst

Equities

An analyst is required to join the teams developing equity information systems. Sound experience in any field of financial systems is required.

Systems Analyst

Portfolio Services

Good experience on financial systems, with a reasonable mathematics background (e.g. Maths 'A' level) is required for this post.

These are excellent career opportunities with good fringe benefits including non-contributory pension scheme, permanent health insurance scheme etc. To apply, write or phone, asking for Neville John on 01-242 9356 (day) or Farnborough (Kent) 52880 (evenings and weekends)

OCC Computer Personnel Limited,
16 Bedford Row, London WC1R 4EB.
Telephone: 01-242 9356



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London & Midlands

ON QUOTA £12,000 plus

For a major computer manufacturer expanding into the mini computer area. Applicants should have experience as a Sales Executive or in pre-sales support with one of the well known manufacturers. Promotion opportunities for those with managerial potential. Base salaries in range £6,000-£7,000 plus guarantee and car allowance. Reference 138.

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Philip Egerton & Associates

Selection Consultants
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Applicants, preferably professionally qualified, should be proven team leaders capable of managing two or more major development projects, ideally relating to the development of production central, project planning, stock control and engineering related systems.

The ability to communicate with users, investigate business systems needs and develop systems with a VTP and batch framework is desirable.

The Company operates an IBM 370 computer running under DOS/VMS with power/IME and CICS. Hardware software are constantly under review and being upgraded to meet the growing demands for computer-based systems within the Company.

Conditions of Employment are attractive and include a Contributory Pension Plan with relocation expenses where appropriate.

For further information and an application form, please write or telephone:

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INVERNESS
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SOFTWARE ENGINEERS/ PROJECT ENGINEER

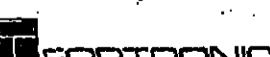
We currently have vacancies for two software engineers to work on M6800/PDP 11 projects. Assembler experience is necessary, while CORAL 68 would be an advantage.

Quote Reference: CVW/8D

A vacancy also exists for a project engineer for microprocessor based products. Proven microprocessor hardware design experience required (preferably Motorola 6800), Project Management Experience would be an advantage.

Quote Reference: CVW/KM

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Due to our continuing expansion programme we are offering challenging opportunities throughout Europe.

Applicants should have a mini/micro background, preferably with PDP 11's and be keen to keep up with the latest technology.

Appointments are at various levels with attractive salaries - better than your present one - foreign travel opportunities and large company benefits.

There are opportunities in:

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Practical systems programming background would be an advantage. Several openings in the UK and Germany, with foreign travel possibilities.

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Engineers to maintain mini/micro computers and peripherals. PDP 11 maintenance experience is necessary. Opportunities in Belgium, Germany, Switzerland and Scandinavia.

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Area Sales Manager (Southern)



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MYRIAD

SENIOR PROGRAMMER

NORTH WEST LONDON

TO £6,750

Our client, a major bureau installation is anxious to recruit an additional Senior Programmer to support the planned growth in 1979.

The company provide a service to a wide range of industries and it is expected that the successful applicant can lend his experience to developing future applications to be used in a bureau environment.

The ideal candidate should have a minimum of two years' commercial COBOL programming experience, and must be capable of recognising and reacting to user requirements: The position provides an outstanding opportunity to join an enterprising installation where every effort is made to encourage team-leading potential.

The position offers excellent scope for advancement together with the opportunity to work on a variety of projects.

Ref: EN1/103

LEAD PROGRAMMER

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TO £6,000

We are seeking an IBM programmer with a minimum of two years' experience of COBOL. Ideally you will be keen to lead a small programming team and gain indepth technical involvement in real-time programming with database and communications applications. Extensive training in software will be given and the opportunity to develop your career into either analysis or alternative database and software design are very real possibilities.

The company, a well-established engineering concern, is currently developing a broad range of on-line real-time applications in a project oriented environment. These positions both offer considerable career potential with a company committed to technical development of computer personnel. Relocation assistance, five weeks holiday and an excellent staff canteen together with a busy professional working environment make this an excellent career opportunity.

Ref: E2/0103

ANALYST/ PROGRAMMERS

BEDFORDSHIRE

TO £7,000

Our client, a large and successful manufacturing organisation with a multi-million pound turnover are about to embark on their next stage of computer development. In order to ensure the effective implementation of this project within schedule additional Analyst/Programmers are required to join a professional team working to very high standards.

Although the company operate a large IBM 370 mainframe, applicants with relevant experience on other manufacturers hardware are just as eligible as a mature approach and sound manufacturing systems knowledge are prime requisites.

Successful applicants must possess a minimum two years COBOL programming experience together with a least one year's analysis involvement. In return for which attractive career progression and company benefits are offered.

Ref: NI1/103

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£5,000-£6,000

A new position has recently been created with this busy Engineering Company, by the installation of a new IBM mainframe. While several on-line application systems are currently being developed for the new machine a Technical Support Programmer is required to implement these systems on the new hardware. Working with OS/JCL and COBOL the successful applicant will implement these systems, trouble shooting/run time problems and generally tuning the performance of the systems once established.

Although COBOL experience is required training will be given since, in the first instance, indepth experience of IBM 370 operation and OS/JCL are of prime importance.

Company benefits, and conditions of employment are excellent, together with potential to move into a technical specialist role.

Ref: E3/0103

MYRIAD APPOINTMENTS LIMITED

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Recruitment



in Informatics

Jnr/Snr/Mini/Micro Specialists Denmark

Salaries: £10K — £15K

Our client is the leading Scandinavian Systems and Software Development Group recognised as Market Leaders in its field. Owing to continued expansion in a wide variety of applications areas including Data Communications, Message Switching, Computer Networking and Mini Computer Software, a significant number of experienced career orientated personnel are urgently required. Emphasis will be placed on technical involvement and in-depth experience in the areas of activity outlined above. Whilst a degree or equivalent qualification in either Computer Sciences or Mathematics is desirable, significant relevant experience will be considered in lieu. Reference is a solid Assembler background within a Mini Computer or Microprocessor environment. Project locations are primarily in Copenhagen and suburbs although candidates can work (should they so desire) in the Netherlands, Sweden or Germany. Of prime importance is demonstrable enthusiasm to relocate to Denmark for an extended period. Every assistance will be given in relocation, including the cost of removal of all personal effects, initial accommodation expenses and a resettlement allowance. Interviews will be held as soon as applications are received and offers of employment will be made within 10 days of interview.

(Ref LOG)

Analysts & Programmers Inner/Greater Manchester

Salaries: c £6K - £8.5K

Our client is a major International Company recognised as market-leaders in its field and has retained Logistix to assist in recruiting the following key project team members — Real-Time Mini Programmers, Data Base Designers, Communications Programmers and Applications/ Software Programmers. Experience of any of the following will be especially welcome: RSX 11, RTL 2, Assembler, PL-1, COBOL, IMS DB-DC. For those who enjoy overseas travel there will be ample opportunity to work at the company's E.E.C. offices in Sweden and the Benelux.

(Ref LOG)

Successful candidates must demonstrate qualities of leadership potential, determination and be self starters. It is expected that all staff should have the ambition to achieve Project Management status quickly.

Interviews will be held at one of the company's three UK offices most convenient to the candidates residence.

(Ref LOG)

RSX 11 Programmers Netherlands

Salaries: £10K - £15K

Many of the forefront developments in Mini Computer Software and Data Communications are emanating from Europe and if you aim to move into frontier technology the opportunity arises to join a highly reputed Systems and Software Development group engaged in prestigious projects in the areas of Data Communications, Message Switching, Networking and Process Control. Existing and new project teams require Consultants, Systems Designers, Senior Analysts, Analyst/Programmers and Programmers with relevant experience in at least one of the above areas of activity. In particular, extensive Mini Computer Assembler experience is essential. Successful candidates are likely to be aged between 22 and 35 years with a degree or equivalent (Computer Sciences or Maths) or extensive relevant experience in lieu. You will most certainly contribute valuable expertise to this industrious group whilst expanding your own threshold of experience through working closely with other professionals at your own level. Our client will pay full relocation expenses for you and your family and provide a generous resettlement advance in addition to meeting the costs of temporary accommodation pending location of permanent housing. Numerous other benefits contribute to make this a very attractive opportunity.

(Ref LOG)

Scientific Programmer Italy

Salary: £10K - £12K

THE CLIENT: A multi-national Research and Development Institution is further expanding its team strength in the areas of scientific project implementation and requires several permanent scientific Programmers with Mini Computer Assembler or Fortran experience. Incidentally, we particularly wish to speak to candidates with current or very recent HP 2100 involvement.

THE APPLICATIONS: A wide variety of projects is currently being developed for implementation in the early '80s. Specialist skills in the areas of one or more of the following are especially useful:

(Ref LOG)

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A European manufacturer of V.R.C. and Office Business Systems seeks several additional Programmers and Systems Analysts who will be engaged in developing several new challenging commercial applications. The opportunity also exists to develop into IBM mainframe projects at a later date.

Suitable applicants must have current experience of writing Programs primarily in BASIC and secondly Business Assembler within the environment of a

(Ref LOG)

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SYSTEMS ANALYST £7,000

NORTH LONDON

The appointment is for a systems analyst with a good background in commercial data processing, preferably within a manufacturing environment. Candidates should have at least two years in systems analysis and previous programming experience.

Application areas of particular interest are financial, order processing and stock control where current methods are to be replaced with on-line systems. The installation is a Univac 90/30.

Our client is a major manufacturer serving the construction industry with a comprehensive range of nationally known products. The position is open to someone seeking a real involvement over a wide variety of tasks within the company's computer department. Location is North London.

Applications can be made in writing or by telephone to Miss Anne Sweeney at these offices —

01-582 2600

Modern Marketing Limited
Atellic House, 93 Albert Embankment
London SE1 7UB
Telex 21407 MMHGRP G

Systems Software Engineers

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Our client, one of the largest international organisations involved in the design and manufacture of electronics systems, offers outstanding opportunities in Southern California on exciting and exacting projects with generous rewards.

THE PACKAGE: In addition to a very realistic salary, the company also provides full relocation expenses, medical insurance and pension schemes as well as initial paid accommodation expenses for you and your family. Interviews will be held in London during mid and late February and offers will be made by the end of the month.

Experience must include a minimum of four years in a major UK aerospace or defence contracting company, and a relevant qualification.

Attractive starting salaries will be accompanied by generous relocation assistance for you and your family to the US. Interviews will be held in London in the near future.

If you are interested in exploring these opportunities, in

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All classified copy should reach our offices no later than 5.30 pm on Monday preceding Thursday's publication. If complete artwork is supplied, 12 noon on a Tuesday.

Ring David Atkey for further details on 01-261 8016

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The reason is simple. We know that we are successful only if our staff are.

Senior Software Staff

(Ref PS/01)

For both mainframe and minicomputer projects which include commercial applications, monitoring and control, and scientific analysis.

Applicants should have at least three years programming and/or analysis experience in high-level language or assembler on any leading mainframe or mini. Salaries will be in the range of £4,500 to £6,500.

Vacancies exist in our Greenford, Birmingham and Manchester offices.

Applicants must have at least five years experience including some work in consultancy, system design or team management. Substantial knowledge is required of either high level language implementation on a leading mainframe or assembler language development on DEC, Data General or other leading minicomputers. We are especially interested in experience of:

- database systems
- distributed systems
- data communications
- telemetry
- operating systems design and implementation.

Salaries will be up to £8,500, with a car allowance or company car for those at the top end of the scale.

There are vacancies at our Greenford, Birmingham and Manchester offices.

Programmers

(Ref CP/01)

For both mainframe and minicomputer projects which include commercial applications, monitoring and control, and scientific analysis.

Applicants should have at least three years programming and/or analysis experience in high-level language or assembler on any leading mainframe or mini. Salaries will be in the range of £4,500 to £6,500.

Vacancies exist in our Greenford, Birmingham and Manchester offices.

Applicants must have at least five years experience including some work in consultancy, system design or team management. Substantial knowledge is required of either high level language implementation on a leading mainframe or assembler language development on DEC, Data General or other leading minicomputers. We are especially interested in experience of:

- database systems
- distributed systems
- data communications
- telemetry
- operating systems design and implementation.

Salaries will be up to £8,500, with a car allowance or company car for those at the top end of the scale.

There are vacancies at our Greenford, Birmingham and Manchester offices.

Systems Support Staff

(Ref CE/4)

For specialist support roles within our Customer Engineering Division, which provides nationwide field service for terminal and distributed systems, word processors and data communications equipment.

Applicants should have experience either in sales support for data equipment or in design for digital and analogue systems. A degree or HNC qualification is desirable.

Base location will be in Central London but high mobility will be essential and a car will be provided. Salaries will be in the region of £6,500.

Base location will be Harlow, Essex but high mobility is essential and a car will be provided.

Programmers

(Ref TS/01)

To work on systems software, emulators and advanced packages for applications such as data entry, for Data Logic's PTS100 range of terminal and distributed systems. This is an outstanding opportunity to gain experience in the development of complex high performance standard software.

Programmers will work in small teams, taking considerable responsibility for distinct functional areas of the total system.

Applicants should have one to three years experience of software implementation in high-level or assembler languages. A degree in computing science is desirable.

Location will be Harlow, Essex and salaries will be in the range of £4,500 to £6,500.

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Telephone 01-486 7288.

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STRATHCLYDE REGIONAL COUNCIL

GLASGOW Sub-Region
ROADS DEPARTMENT

SYSTEMS DEVELOPMENT OFFICER

Viceroy House, India Street, Glasgow
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Applications are invited from persons with a Degree in Engineering, Mathematics or Computer Science for the above post at Headquarters. The successful applicant will be required to have had experience in the use of computer facilities in high level structural design and management systems. Duties will include assisting users with applications and developing new techniques. Ref. G57.

COMPUTER SERVICES DEPARTMENT

SENIOR PROGRAMMER

(Fortran)
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The Department of Computer Services provides time-sharing facilities and support to a large number of technical staff within the Region. Engineers, Architects, Statisticians and many other professional users have access to the Authority's main computers from a variety of terminals including graphical display units and plotters.

A Project Team within the Computer Services Department provides software support for these users. Implementing and amending packages and extending these where necessary. The packages supported include engineering design, statistical analysis, school time-table production, network analysis and interacting graphics. The wide variety of users offers scope for applicants with relevant FORTRAN experience to broaden their experience in a stimulating and demanding environment. Ref. G79.

*These salary ranges are inclusive of supplement.

Application forms for Glasgow Sub-Region posts may be obtained from the Assistant Director of Manpower Services, 21 Victoria Street, Glasgow G2 8LP, to whom completed forms, quoting appropriate Ref. No. should be returned by 18th March, 1979.

R. M. O. McCullagh
Director of Manpower Services



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Most of the work our team carries out (about 75% in fact) is development work, frequently using the VDU screen to develop programs direct. We do both on-line and batch work, operating an IBM 370/168 under MVS/TS2. In addition to that, we provide on-site training at all levels, using ASI packages.

If we sound like the sort of company you'd like to be part of, then come and meet us, we'd like to meet you.

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Salary and commission should give annual earnings of £12,000 plus, after an initial period, and a car will be provided. Our ambitious expansion programme, aimed at more than doubling turnover over the next five years, will ensure that the salary and career prospects will be outstanding for those able to seize them.

Relocation expenses will be paid for staff who need to move home.

Write or call quoting ref TS/03 and preferred base:
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29 Marylebone Road, London NW1.
Tel: 01-486 7288.

A Northern Company

Data logic

LONDON BOROUGH OF DRENT
REDFON PROGRAMMER/ANALYST
(£4,017-£4,431 inclusive)

We need a keen person to act as Programmer/Analyst in support of our Redfon Soeckch Key-to-Disc system in order to expand the use of this unique mini-computer. Though eventually the person appointed will be expected to work with the mini-mains of supervision, full Redfon experience is not expected as training will be given where necessary. The post will be suitable for a young computer graduate seeking to widen his/her experience. We use an IBM 370/145 as our mainframe computer and interface with it as envisaged. Generous location expenses are available, including an annual tell-me-on-tickets subsidised staff canteen, 35 hour week, flexible working hours.

Application forms from the Adminstration Manager, Room 708, Brent House, High Road, Wembley, Middlesex, HA9 7QR. Tel: 081-938 1371 (24 hour Answering service). Reference number R/76/1/D must be quoted.

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Sales Executives

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We are the external forecast. The other internal, opposing, and just as necessary forecast, is a composite judgment of what is possible in terms of sales and production. This is achieved by creating the amalgam of customer, sales, production, and management opinion already discussed earlier on this topic.

The two forecasts should then be compared. They will seldom be the same but any

THE SALES AND MARKETING BIT

FORECASTING V

'Rubber' figures mean loss of credibility

severe deviation will indicate a contradiction somewhere which needs to be resolved.

The approach provides three significant benefits: 1. It checks the accuracy of the original sales forecast; 2. It crystallises the judgment and considerations of sales management; and 3. It involves all those people who will be called upon to accept the commitment implied by the forecast.

We then discussed the relative merits of sales forecasting by extrapolation and the use of moving annual totals — although moving periods such as quarterly totals might in some situations be preferable.

In some ways the smoothing effect of the moving annual totals not only to iron things out but also press things in. This particularly applies to identifiable and non-recurrent exceptions or short-term trends.

For instance there may have been a period, of say six months, in a previous year when sales within a computer bureau were restricted due to the overdrive delivery of an additional computer. There may also have been variances due to economic influences. Exponential smoothing is a mathematical device which is able to compensate for these kinds of special variances.

If you want to get really clever, then it is possible to use algebraic methods for evaluating the effect of one variance upon another, namely regression analysis, but I never got that ambitious.

Within the context of long-term forecasting there is a need to take into account the effect of both technological advancement and competitive products. Correlation analysis takes into account the possible effect that the marketing of one product may have upon another — for instance, the influence of key-to-disc systems on punch cards.

Tied indicators are a very precise form of correlation where the sales of one product is a direct function of the sales of another; for example, floppy discs and cartridges are virtually dependent on the number of mini and microcomputers sold.

The application of some or all the methods of analytical and mathematical forecasting mentioned in this and last week's column should eventually bring the sales manager to a sales forecast which he believes is a fair, (fair/reasonable not fair/moderate), assessment of likely sales achievement for the coming year.

That is the external forecast. The other internal, opposing, and just as necessary forecast, is a composite judgment of what is possible in terms of sales and production. This is achieved by creating the amalgam of customer, sales, production, and management opinion already discussed earlier on this topic.

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Puzzle Answer

6 4 8 3
6 4 8 3
9 4 8 5 1

1 0 7 8 1 7

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PRIME

Ascii through the Logic Gate

An epic in 32K words, by Richard Forsyth

Block 28 (Ivory Tower Block)

Cleo's exploration of the disused mercury mine has led her deep into trouble. She has fallen through the ventilation shaft of an experimental laboratory hewn out of the rock.

SHE looked around her. The place was fitted out like an alchemist's den. A stuffed crocodile hung by chains from the ceiling. Its sharp teeth glinted in the pallid artificial light. Round the walls, like a big game hunter's trophies, were mounted the heads of various exotic species, mostly herbivores such as elks and antelopes, though she spotted a black puma and a snow leopard among them. Here and there on the shelves she could see, pickled in jars of yellowish preservative, what she took for animal brains. The foetid smell of formaldehyde pervaded the air. She had upset a bottle when she landed and the liquid was oozing across the floor.

At the fur end of the laboratory, to her right, an android had put down the retorts and phials he had been busy with and was eyeing her with curiosity.

"Aha!" he exclaimed, turning off his Bunsen burner. "Just what I want for my cross-breeding experiments—a human female of childbearing age!"

Cleo didn't like what she heard.

He began walking towards her. She noticed first his style of dress. Eschewing the lab worker's sterile white coat, his garb was the epitome of trendiness. His pale lemon kaftan was patterned with intricate Arabic calligraphy, and unbuttoned at the top to reveal a grizzled expanse of chest hair. Against this virile mottess some sort of runic pendant hung on a leather thong round his neck. Hip-hugging jeans clung modishly to his middle-aged spread.

He stopped before he reached her and opened a refrigerator. In among the racks of biochemical specimens was a six-pack of beer. He pulled out two cans and handed one to Cleo.

"Here," he said, popping open his can, "have one."

Cleo gratefully gulped down the ice-cold luger. He took a couple of swigs and then asked: "Who are you? I'm Mike Rose, Director of the Meta-Physical Laboratory."

"I'm Cleo Calculus."

"Well Cleo, if you will just finish off your drink and come this way, I'll show you what you have to do. It shouldn't take long; and it won't hurt a bit."

His polished bedside manner was at once so affable and



imperious that it had a mesmeric quality. She found herself involuntarily following him. He led her down to the other end where there was a little cubicle with a curtain which he drew aside.

"Just step in here and take off all your clothes. I'll be back in a minute," he told her.

Meekly, without question, she went inside, almost watching herself as a spectator. Her steps gradually receded. There was the sound of a latch being lifted.

Cleo peeked out. At the other end of the lab, Rose was holding the door open to let in his assistant.

"Piltdown!" she exclaimed in surprise and delight, running out though she was half naked.

"You're acquainted, then," remarked Rose mildly.

"Of course," she replied. "It's Piltdown. But he can't be Piltdown's dead."

"Actually this is Neddy (short for Neanderthal). Piltdown's clone," explained Rose. "We always keep a spare copy."

Cleo gazed up at him. Piltdown's face was etched in

ibly in her memory. This certainly was the spitting image. He smiled down, hardly seeming a stranger.

"Now then, shake hands," Rose said. "Cleo meet Neddy Bigfoot. Neddy, this is Cleo."

"Pleased to meet you," said Cleo.

"Bonan tagon," replied the ape.

"He still speaks Esperanto," said Cleo. "Why don't you teach him English?"

"Too illogical," explained Rose. "He's more at home in pure third-order Predicate Calculus anyway; but I find it hard to keep up with him. Esperanto is a concession to my frailty: it's the least methodical language I can permit him to learn without polluting his mind with human values."

"But I can't talk to him," complained Cleo.

"Oh you'll get along fine without it, I can see," Rose answered, "which is a pity in a way because I shall now have to abandon my plan to form a hybrid by mating human with Susquatch."

Cleo listened with relief. Rose was beginning to seem eminently reasonable.

"Yes," he continued. "I'm afraid you're no use to me. You're pregnant already."

"What?"

"Don't worry. I can tell before you can — less than seven days after the event. I only need one look. I'm the world's leading expert."

"Impossible!" she expostulated.

"Wait and see," he replied calmly. "Time will tell."

"But, I mean . . . I thought androids couldn't . . ."

Rose raised his eyebrows. "An android father, eh? Now you've got me interested again. Some of us can, you know, in the old days all they kept for cybortion was the brain and spinal cord; but modern thinking is that it's more economical to leave most of the vital organs intact."

Cleo blushed deep scarlet.

"You'd better go and put your clothes on again," suggested Rose.

While she was in the cubicle dressing, Rose called over: "Bigfoot will show you around while I decide what's to be done with you."

When she emerged the great ape beckoned and she went out through the door after him. She found herself on a metal balcony riveted into the rock. They stood at the edge of one of the catwalks that crossed and criss-crossed the vast subterranean cavern. She looked down at a hive of industry beneath. Automata of all descriptions (finite, deterministic, non-deterministic, pushdown and linear-bounded) scurried purposefully to and fro across the floor of the cave-like ants, bathed by arc-lights from the vaulting roof. The whole place buzzed with incessant activity.

"Grandu, jes?" inquired her guide.

"Grandu," she replied, "yes." Her mind was not on the busy workers scuttling below. She was thinking of the unborn child in her womb, wondering whether it would ever see the light of day, and, if so, how she would cope.

Is this now burden too heavy for her? Back to Hex next week

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